US011291881B2

(12) United States Patent
Fima

(10) Patent No.: US 11,291,881 B2
(45) Date of Patent: Apr. 5, 2022

(54) TREADMILL WITH LIGHTED SLATS

(71) Applicant: **The Giovanni Project LLC**, Carlsbad, CA (US)

(72) Inventor: **Giovanni Raoul Fima**, San Diego, CA (US)

(73) Assignee: **The Giovanni Project LLC**, Carlsbad, CA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **17/458,160**

(22) Filed: **Aug. 26, 2021**

(65) **Prior Publication Data**

US 2021/0394013 A1 Dec. 23, 2021

Related U.S. Application Data

(63) Continuation-in-part of application No. PCT/US2020/017447, filed on Feb. 10, 2020, which is a continuation-in-part of application No. 16/418,234, filed on May 21, 2019, now Pat. No. 10,556,168.

(60) Provisional application No. 62/919,155, filed on Feb. 28, 2019.

(51) **Int. Cl.**

A63B 22/02	(2006.01)
A63B 71/06	(2006.01)
A63B 24/00	(2006.01)

(52) **U.S. Cl.**

CPC ***A63B 22/0285*** (2013.01); ***A63B 24/0087*** (2013.01); ***A63B 71/0622*** (2013.01); *A63B 2225/74* (2020.08)

(58) **Field of Classification Search**

CPC . A63B 22/02; A63B 24/0087; A63B 71/0622; A63B 2071/0081; A63B 2207/02; A63B 2220/833

See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

4,411,424	A	10/1983	Barnett
4,519,603	A	5/1985	DeCloux
4,564,191	A	1/1986	Atkin
4,927,136	A	5/1990	Leask
5,207,621	A	5/1993	Koch et al.

(Continued)

FOREIGN PATENT DOCUMENTS

CN	202777636 U	3/2013
CN	202834829 U	3/2013

(Continued)

OTHER PUBLICATIONS

"Operating and Maintaining the P30 Console" https://www.precor.com/sites/default/files/manuals/TRM_833_Manuals_EN.pdf Jun. 2011.

(Continued)

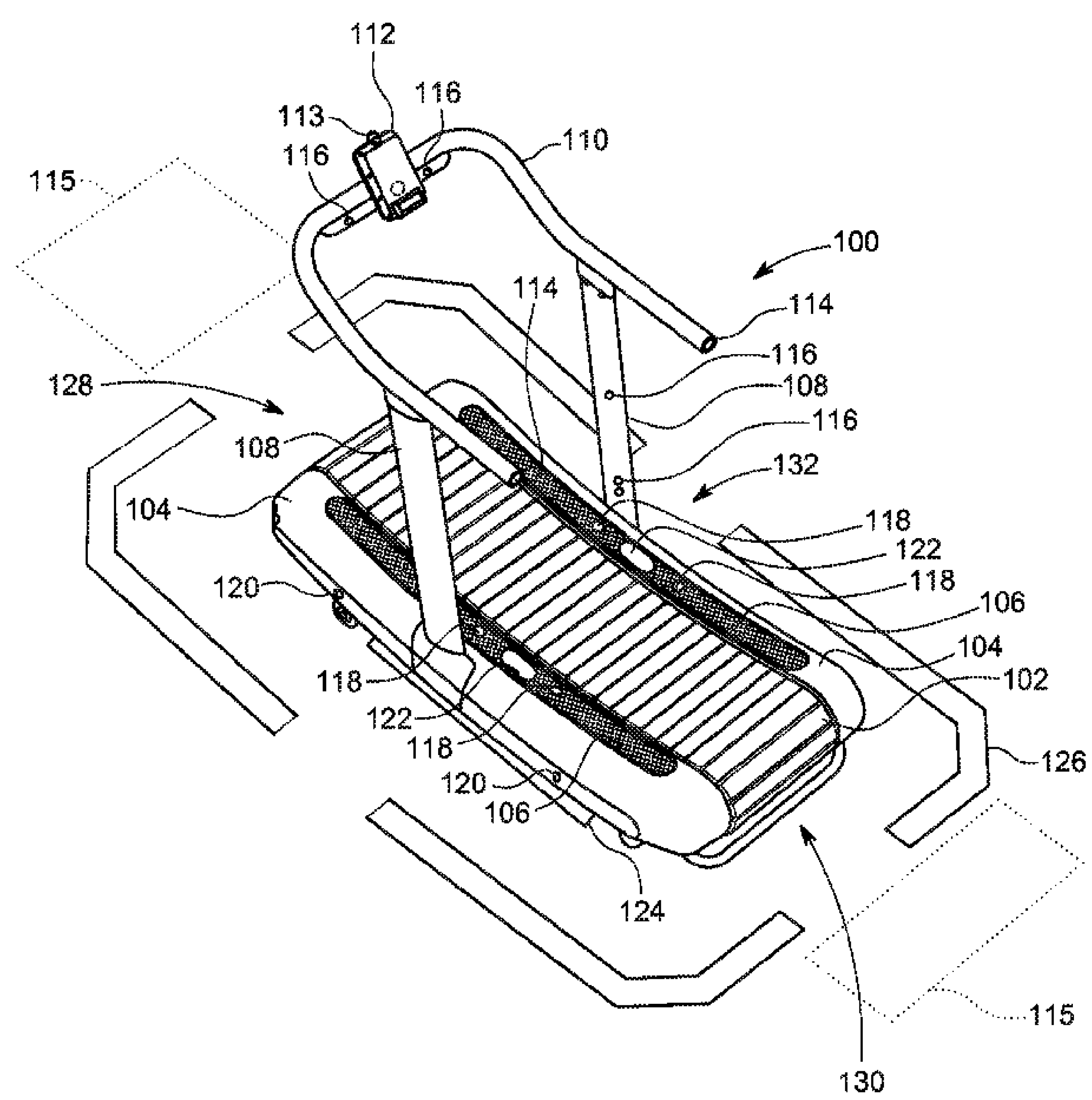
Primary Examiner — Joshua Lee

(74) *Attorney, Agent, or Firm* — Young Basile Hanlon & MacFarlane, P.C.

(57) **ABSTRACT**

A treadmill having a tread comprising multiple slats is configured to rotate around a front axle and a rear axle of the treadmill, wherein at least one of the multiple slats is a lighted slat. The lighted slat comprises a slat base having an upper surface, a leading edge and an underside. A light is attached to the slat base. The treadmill further comprises a power source for the light.

19 Claims, 28 Drawing Sheets



(56) **References Cited**

U.S. PATENT DOCUMENTS

5,368,532	A	11/1994	Farnet
5,385,520	A	1/1995	Lepine et al.
5,492,513	A	2/1996	Wang
5,584,779	A	12/1996	Knecht et al.
5,769,755	A	6/1998	Henry et al.
5,993,358	A	11/1999	Gureghian et al.
6,010,465	A	1/2000	Nashner
6,123,647	A	9/2000	Mitchell
6,626,803	B1	9/2003	Oglesby et al.
6,682,461	B2	1/2004	Wang et al.
6,783,482	B2	8/2004	Oglesby et al.
7,070,542	B2	7/2006	Reyes et al.
7,604,571	B2	10/2009	Wilkins et al.
7,713,172	B2	5/2010	Watterson et al.
7,736,278	B2	6/2010	Lull et al.
7,833,133	B2	11/2010	Stewart et al.
7,854,177	B2	12/2010	Hamady
7,922,625	B2	4/2011	Grind
8,192,329	B2	6/2012	Saitou et al.
8,221,292	B2	7/2012	Barker et al.
8,317,663	B2	11/2012	Stewart et al.
8,435,160	B1	5/2013	Clum et al.
8,480,541	B1	7/2013	Brunts
8,534,444	B2	9/2013	Senger
8,689,948	B2	4/2014	Winkler
8,784,278	B2	7/2014	Flake et al.
8,840,572	B2	9/2014	Whalen et al.
8,920,347	B2	12/2014	Bayerlein et al.
9,186,552	B1	11/2015	Deal
9,430,920	B2	8/2016	Munro et al.
9,604,099	B2	3/2017	Taylor
9,623,281	B2	4/2017	Hendrickson et al.
9,675,839	B2	6/2017	Dalebout et al.
9,694,234	B2	7/2017	Dalebout et al.
9,922,528	B2	3/2018	Munro et al.
9,981,157	B2	5/2018	Bayerlein et al.
10,052,518	B2	8/2018	Lagree
10,207,146	B2	2/2019	Liao et al.
10,286,286	B1	5/2019	Ryan
10,493,349	B2	12/2019	Watterson
10,816,177	B1	10/2020	Bayerlein et al.
2002/0045517	A1	4/2002	Oglesby et al.
2005/0026750	A1	2/2005	Oglesby et al.
2005/0039541	A1	2/2005	Kurono
2006/0019783	A1	1/2006	Hoag
2006/0035757	A1	2/2006	Flick et al.
2007/0032353	A1	2/2007	Wilkins et al.
2007/0201727	A1	8/2007	Birrell et al.
2008/0001772	A1	1/2008	Saito
2009/0036272	A1	2/2009	Yoo
2010/0093492	A1	4/2010	Watterson et al.
2010/0160115	A1	6/2010	Morris et al.
2010/0216599	A1	8/2010	Watterson et al.
2012/0010053	A1	1/2012	Bayerlein et al.
2012/0021873	A1	1/2012	Brunner
2014/0011642	A1	1/2014	Astilean
2014/0066263	A1	3/2014	Huang et al.
2015/0352400	A1	12/2015	Bayerlein et al.
2016/0213976	A1	7/2016	So et al.
2017/0106222	A1	4/2017	Mayer et al.
2017/0136289	A1	5/2017	Frank
2017/0266533	A1	9/2017	Dalebout et al.
2017/0333747	A1	11/2017	Athey
2018/0001134	A1	1/2018	Bayerlein et al.
2018/0093130	A1	4/2018	Wagner
2018/0140903	A1	5/2018	Poure et al.
2018/0154209	A1	6/2018	Watterson
2018/0214730	A1	8/2018	Larose et al.
2018/0243611	A1	8/2018	Bradley
2018/0308334	A1	10/2018	Minocha
2019/0009128	A1	1/2019	Yoo
2019/0054344	A1	2/2019	Athey et al.
2019/0168066	A1	6/2019	Yoo et al.
2019/0168067	A1	6/2019	Bates et al.
2019/0217182	A1	7/2019	Kueker et al.
2020/0129837	A1	4/2020	Liao et al.
2020/0332990	A1 *	10/2020	Bayerlein F21V 23/0442
2021/0041092	A1	2/2021	Bayerlein et al.

FOREIGN PATENT DOCUMENTS

CN	203507440	U	4/2014
CN	205665807	U	10/2016
CN	107029383	A	8/2017
CN	206613083	U	11/2017
CN	107899183	A	4/2018
CN	108031061	A	5/2018
CN	108355304	A	8/2018
CN	108452480	A	8/2018
CN	108905060	A	11/2018
CN	208049266	U	11/2018
CN	109381837	A	2/2019
EP	0858358	B1	9/2000
EP	2562666	A2	2/2013
GB	2467359	A	8/2010
KR	200292457	Y1	10/2002
KR	200358992	Y1	8/2004
KR	20070012347	A	1/2007
KR	20080016223	A	2/2008
KR	101321182	B1	10/2013
KR	101345798	B1	12/2013
KR	101852748	B1	6/2018
WO	9952601	A1	10/1999
WO	2010124267	A1	10/2010
WO	2018106598	A1	6/2018
WO	2019028657	A1	2/2019
WO	2019226644	A1	11/2019

OTHER PUBLICATIONS

Simon Fraser University "Two-Axis Circular Treadmill for Human Perception" May 5, 2010 http://www.sfu.ca/~ber1/web/iSpaceMecha/HoyleNaugleBrosasArzanpourWangRiecke_2010_CSME_ConferencePaper_Two-Axis_Circular_Treadmill_for_Human_Perception_and_Behaviour_Research_in_Virtual_Environments.pdf.

International Search Report and Written Opinion of corresponding application PCT/US2019/035991, dated Nov. 29, 2019; 11 pages.

Move Safety Device for Treadmills (Patented & Registered); YouTube; Sep. 15, 2009; https://www.youtube.com/watch?app=desktop&v=0UqKe9uA2DI.

* cited by examiner

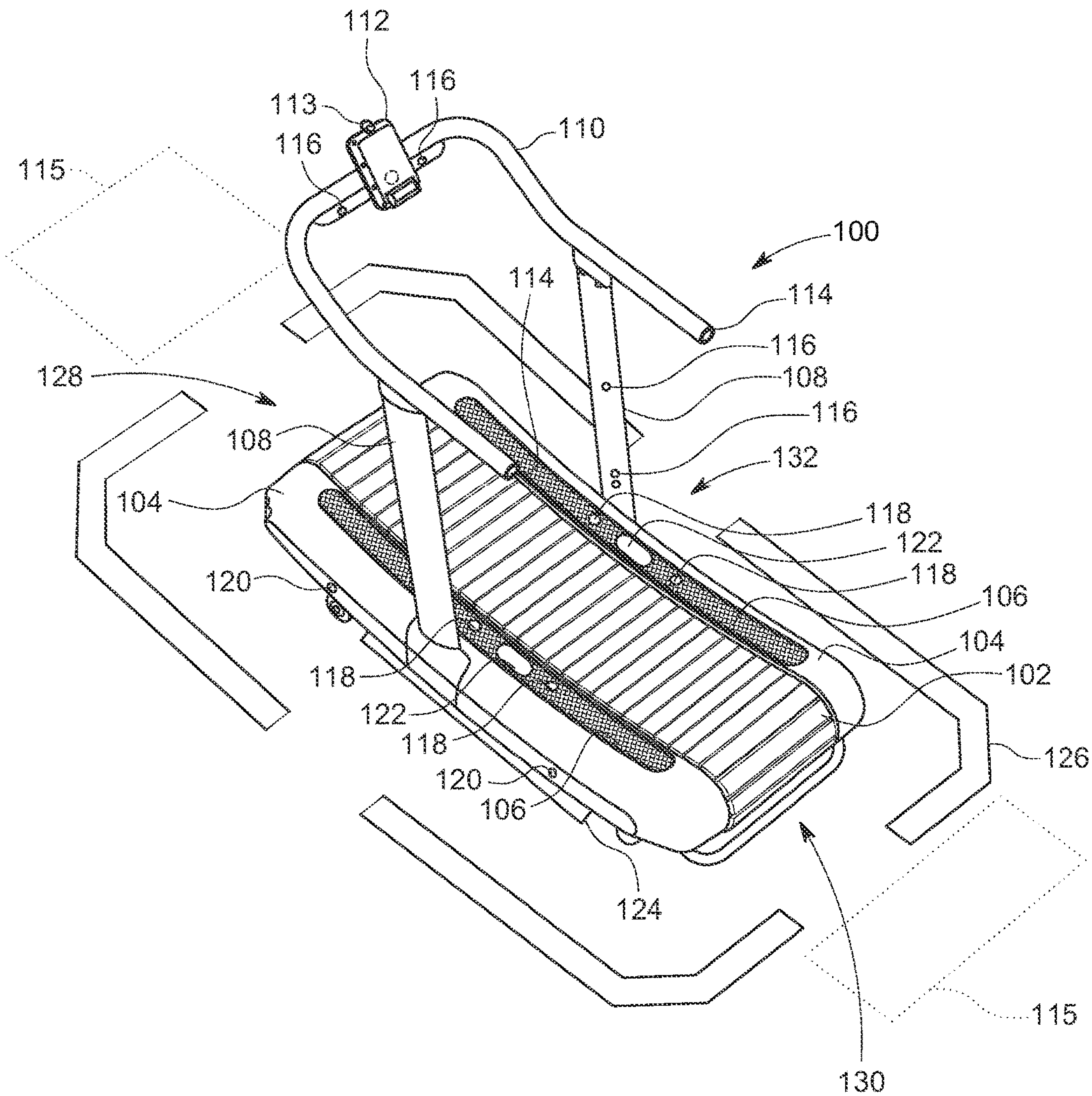

112
116
113
110
116
115
100
114
114
116
128
108
108
116
132
104
118
122
120
118
106
104
118
102
122
118
126
120
106
124
130
115

FIG. 1

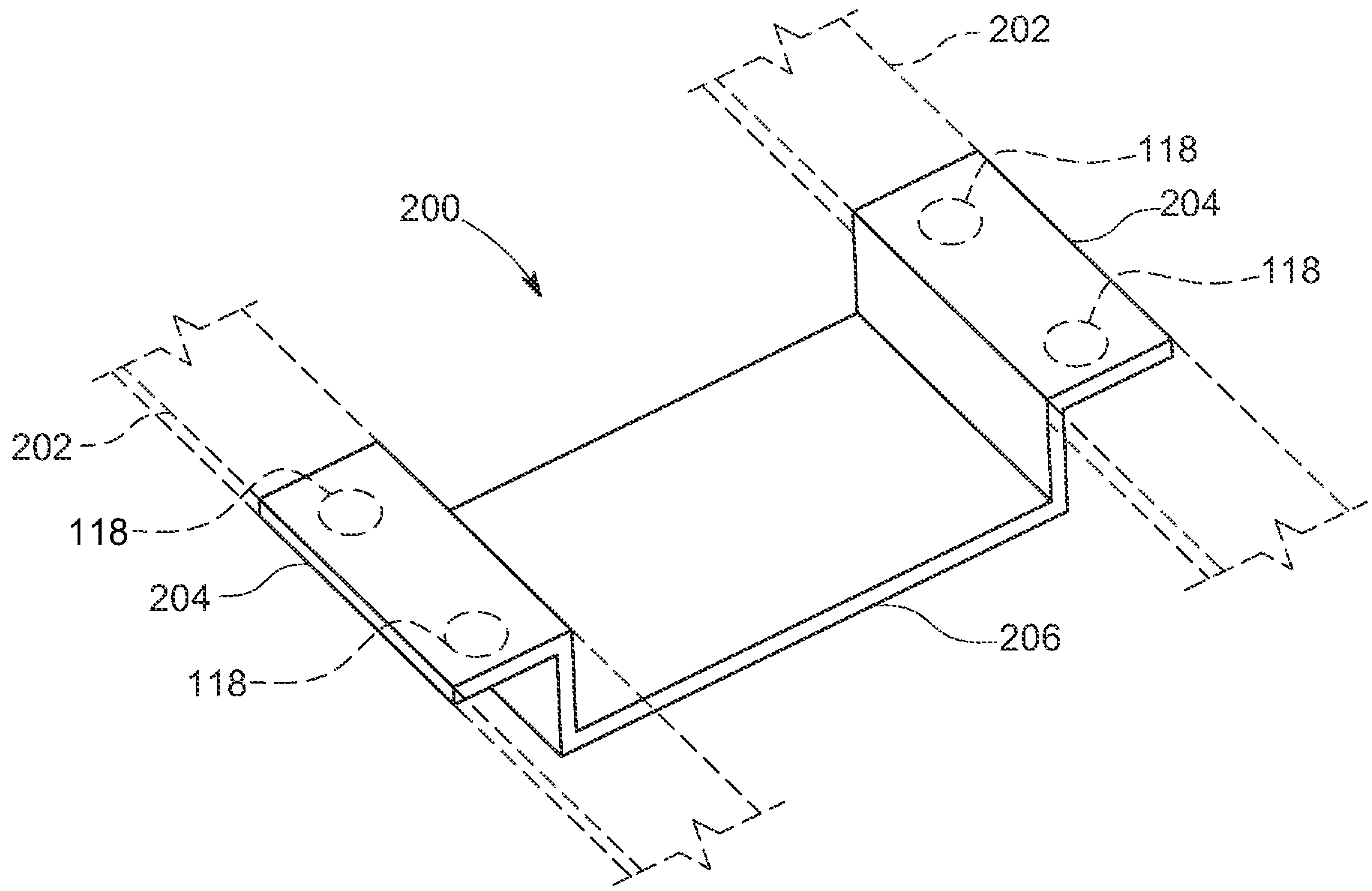


FIG. 2

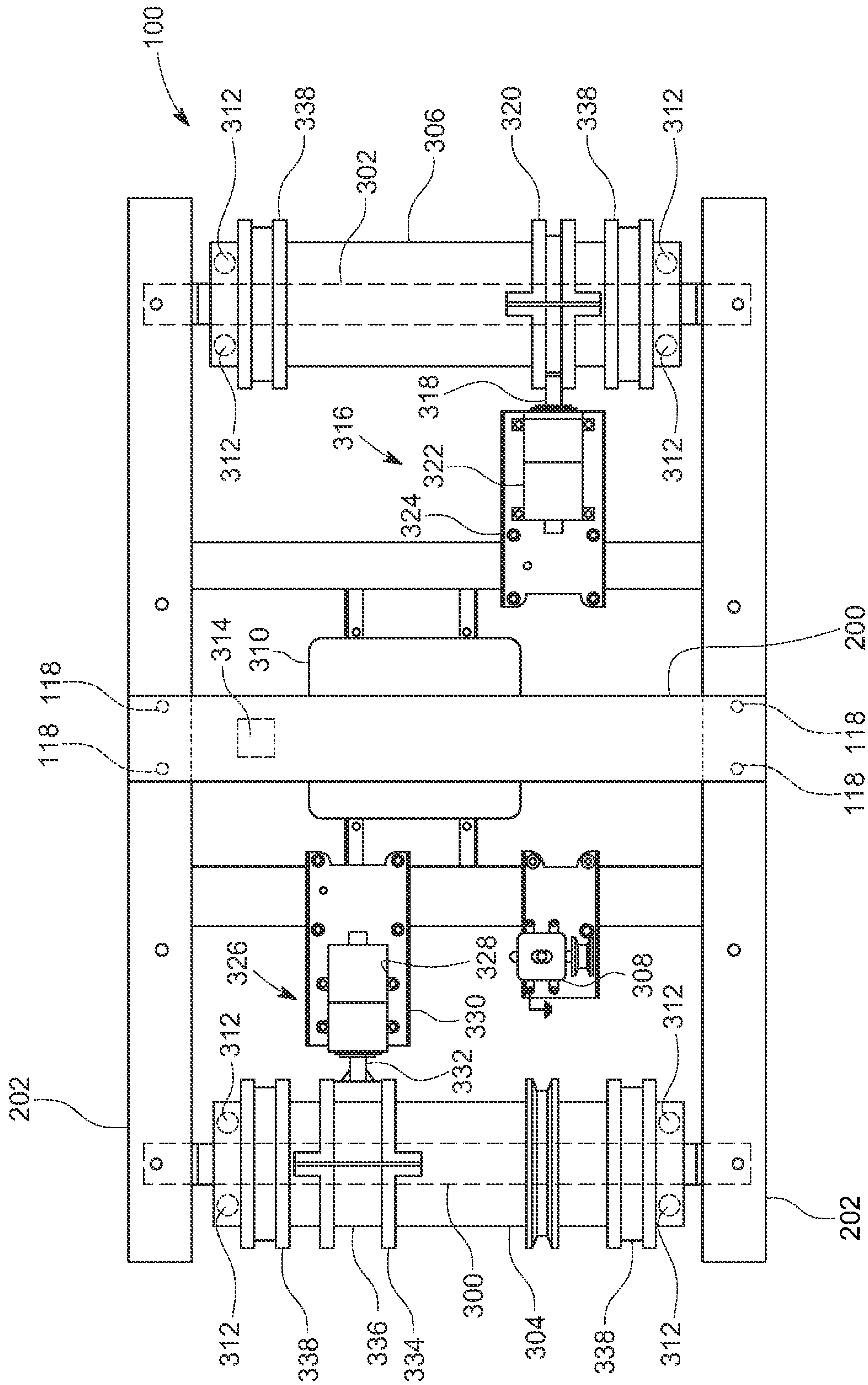

100
312
338
306
302
320
338
312
318
316
322
324
312
312
314
310
200
118
118
118
118
202
326
328
330
332
308
312
312
300
304
338
336
334
338
312
312
202

FIG. 3

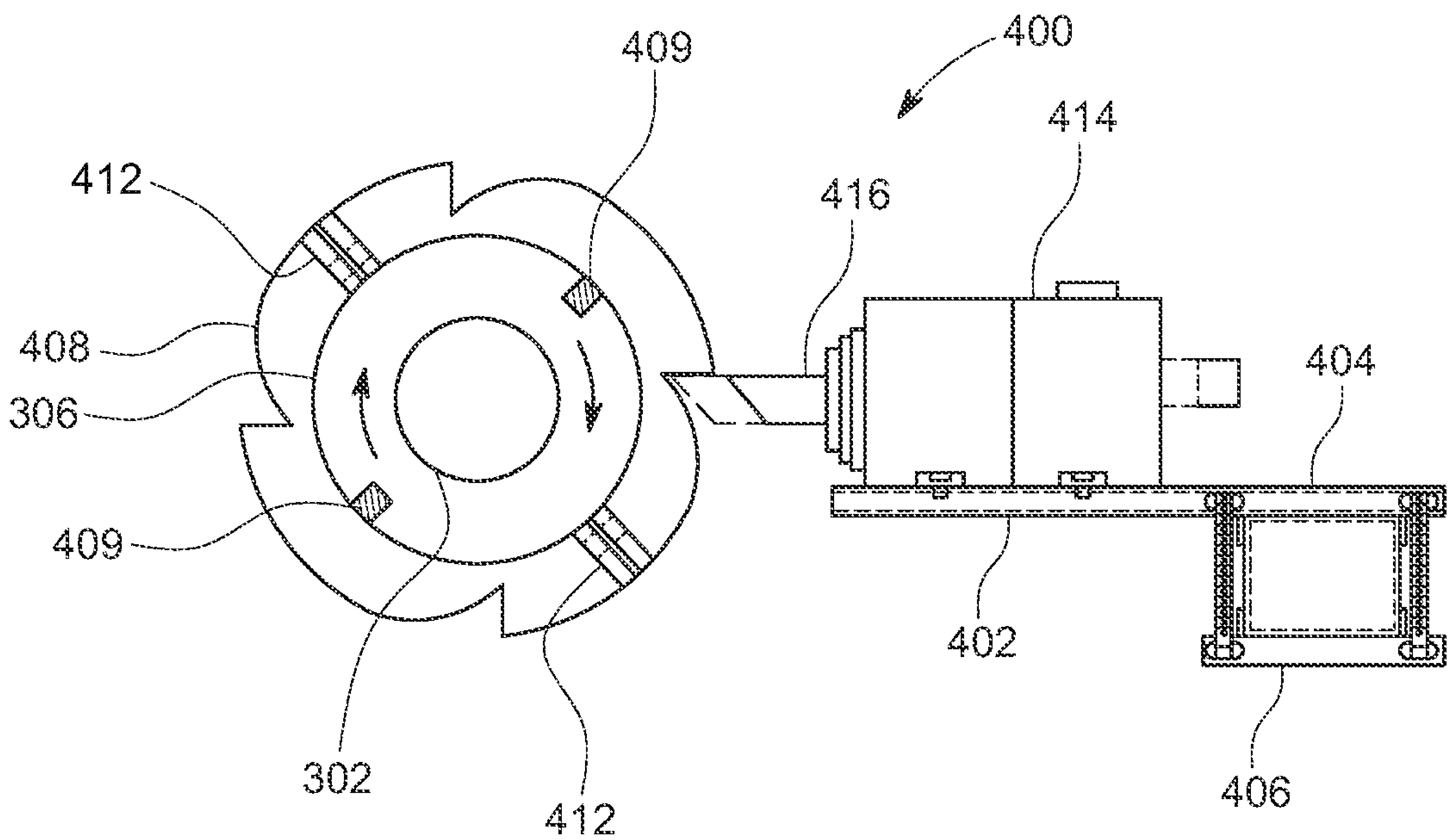


FIG. 4

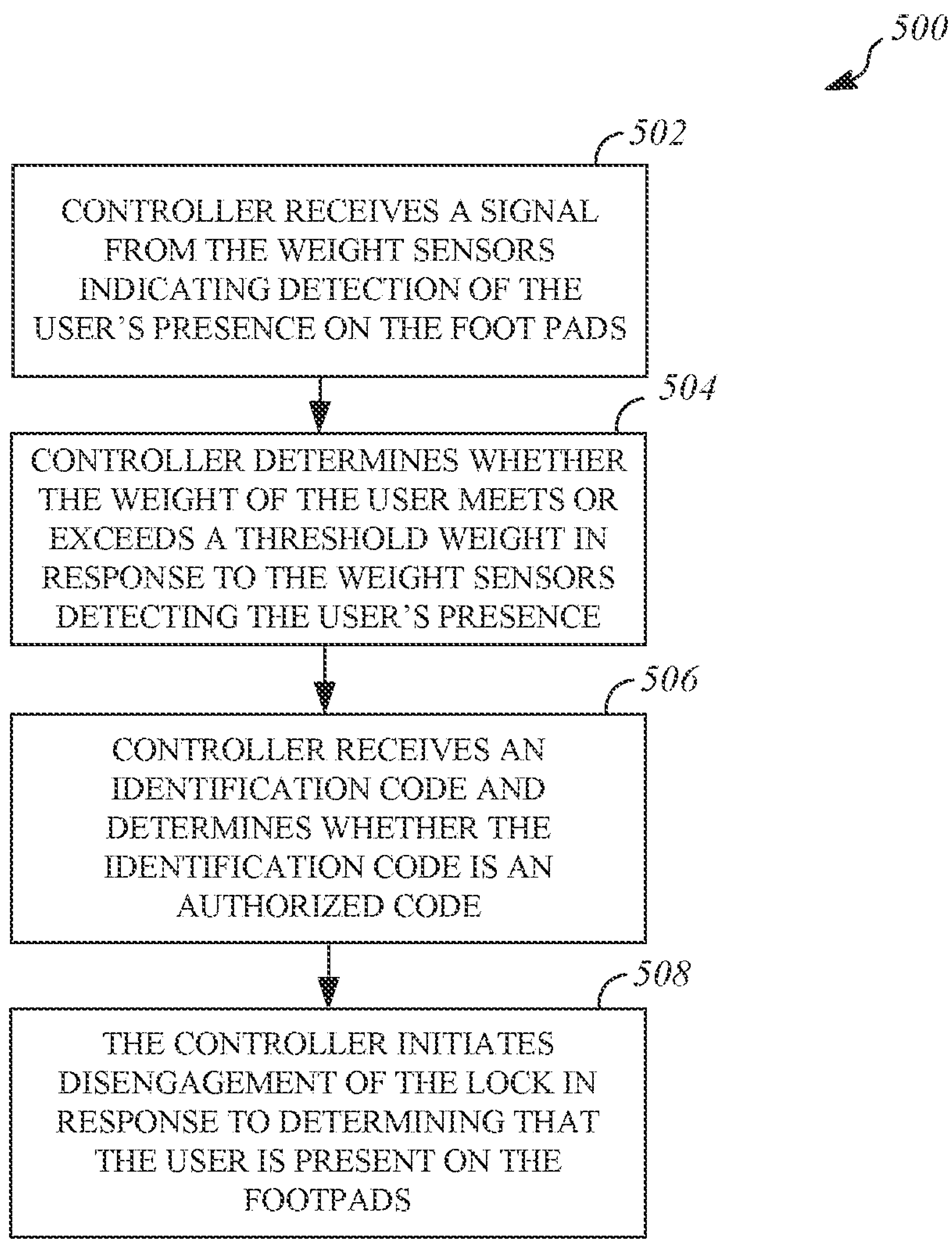

500
502
CONTROLLER RECEIVES A SIGNAL FROM THE WEIGHT SENSORS INDICATING DETECTION OF THE USER'S PRESENCE ON THE FOOT PADS
504
CONTROLLER DETERMINES WHETHER THE WEIGHT OF THE USER MEETS OR EXCEEDS A THRESHOLD WEIGHT IN RESPONSE TO THE WEIGHT SENSORS DETECTING THE USER'S PRESENCE
506
CONTROLLER RECEIVES AN IDENTIFICATION CODE AND DETERMINES WHETHER THE IDENTIFICATION CODE IS AN AUTHORIZED CODE
508
THE CONTROLLER INITIATES DISENGAGEMENT OF THE LOCK IN RESPONSE TO DETERMINING THAT THE USER IS PRESENT ON THE FOOTPADS

FIG. 5A

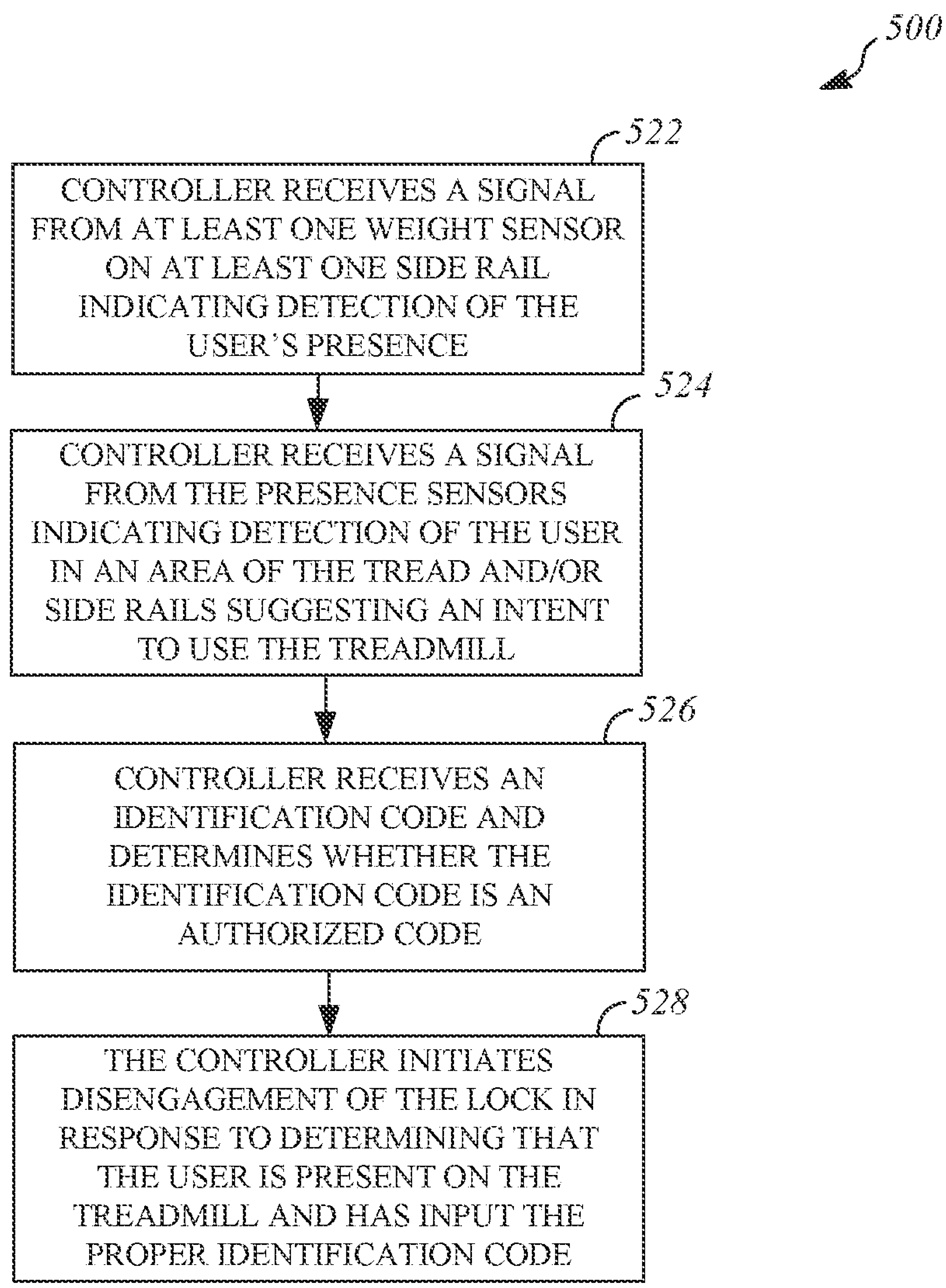

500
522
CONTROLLER RECEIVES A SIGNAL FROM AT LEAST ONE WEIGHT SENSOR ON AT LEAST ONE SIDE RAIL INDICATING DETECTION OF THE USER'S PRESENCE
524
CONTROLLER RECEIVES A SIGNAL FROM THE PRESENCE SENSORS INDICATING DETECTION OF THE USER IN AN AREA OF THE TREAD AND/OR SIDE RAILS SUGGESTING AN INTENT TO USE THE TREADMILL
526
CONTROLLER RECEIVES AN IDENTIFICATION CODE AND DETERMINES WHETHER THE IDENTIFICATION CODE IS AN AUTHORIZED CODE
528
THE CONTROLLER INITIATES DISENGAGEMENT OF THE LOCK IN RESPONSE TO DETERMINING THAT THE USER IS PRESENT ON THE TREADMILL AND HAS INPUT THE PROPER IDENTIFICATION CODE

FIG. 5B

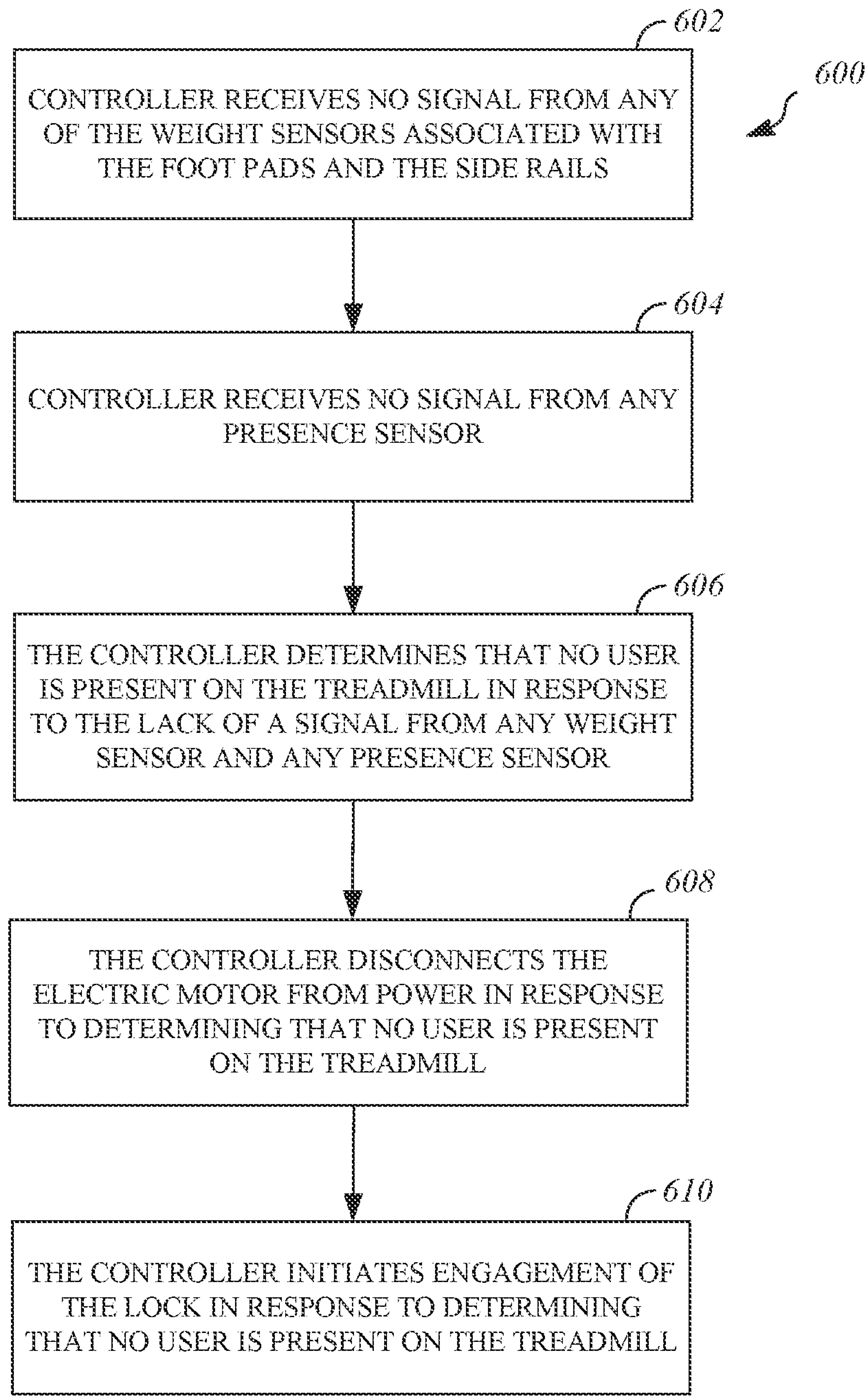

602
600
CONTROLLER RECEIVES NO SIGNAL FROM ANY OF THE WEIGHT SENSORS ASSOCIATED WITH THE FOOT PADS AND THE SIDE RAILS
604
CONTROLLER RECEIVES NO SIGNAL FROM ANY PRESENCE SENSOR
606
THE CONTROLLER DETERMINES THAT NO USER IS PRESENT ON THE TREADMILL IN RESPONSE TO THE LACK OF A SIGNAL FROM ANY WEIGHT SENSOR AND ANY PRESENCE SENSOR
608
THE CONTROLLER DISCONNECTS THE ELECTRIC MOTOR FROM POWER IN RESPONSE TO DETERMINING THAT NO USER IS PRESENT ON THE TREADMILL
610
THE CONTROLLER INITIATES ENGAGEMENT OF THE LOCK IN RESPONSE TO DETERMINING THAT NO USER IS PRESENT ON THE TREADMILL

FIG. 6

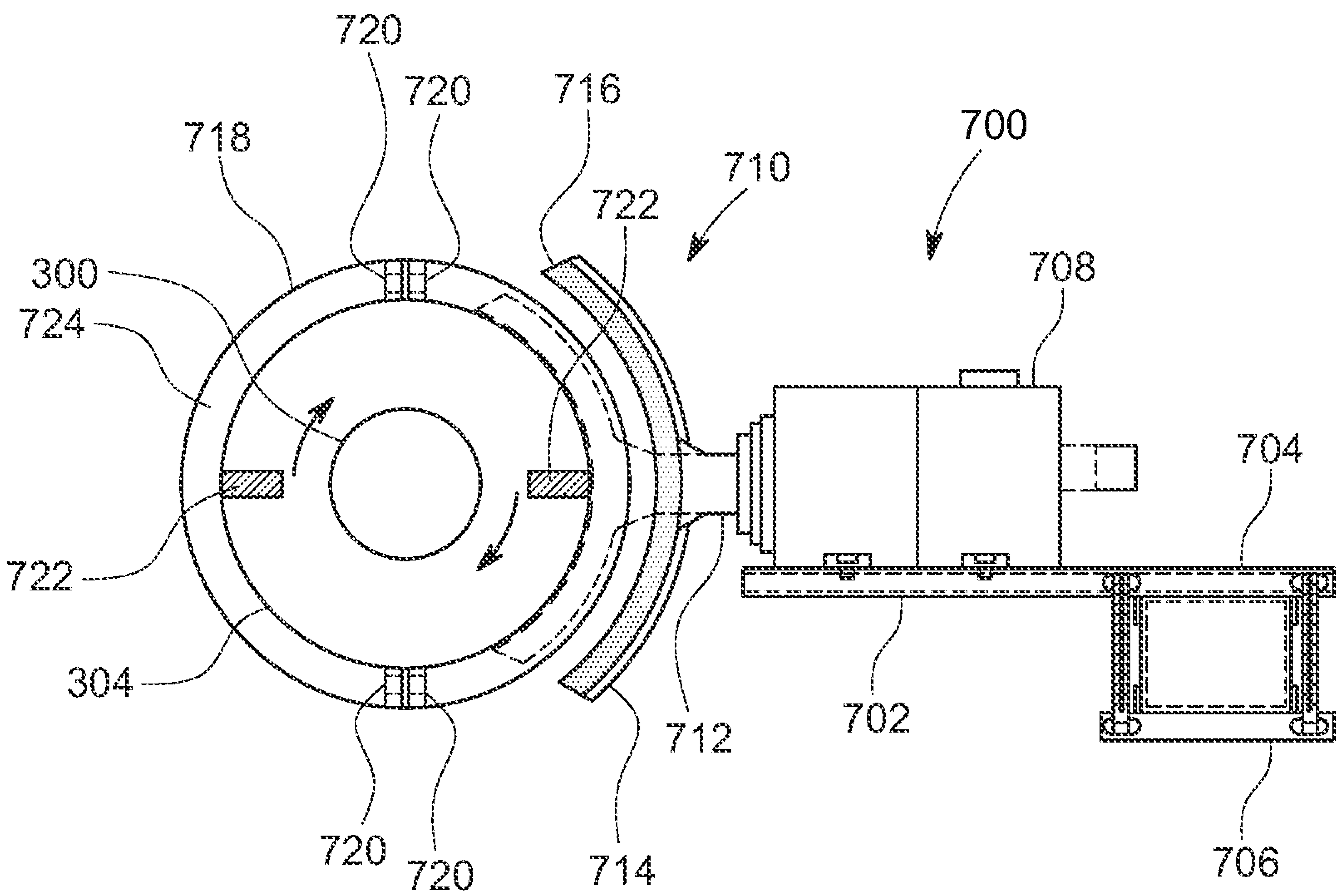

720
720
716
718
710
700
722
300
724
708
704
722
304
702
712
720
720
714
706

FIG. 7

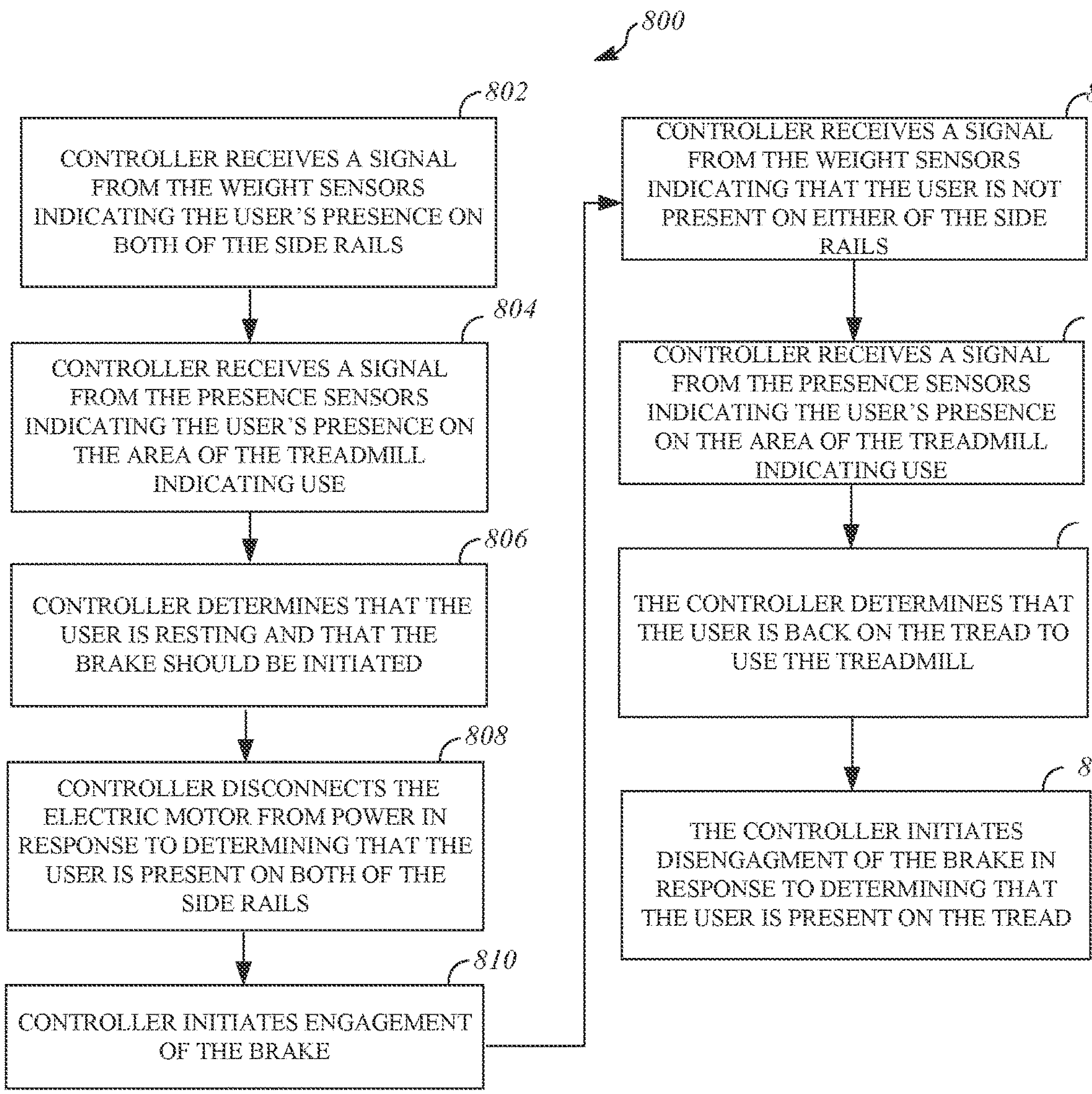

800
802
CONTROLLER RECEIVES A SIGNAL FROM THE WEIGHT SENSORS INDICATING THE USER'S PRESENCE ON BOTH OF THE SIDE RAILS
804
CONTROLLER RECEIVES A SIGNAL FROM THE PRESENCE SENSORS INDICATING THE USER'S PRESENCE ON THE AREA OF THE TREADMILL INDICATING USE
806
CONTROLLER DETERMINES THAT THE USER IS RESTING AND THAT THE BRAKE SHOULD BE INITIATED
808
CONTROLLER DISCONNECTS THE ELECTRIC MOTOR FROM POWER IN RESPONSE TO DETERMINING THAT THE USER IS PRESENT ON BOTH OF THE SIDE RAILS
810
CONTROLLER INITIATES ENGAGEMENT OF THE BRAKE
812
CONTROLLER RECEIVES A SIGNAL FROM THE WEIGHT SENSORS INDICATING THAT THE USER IS NOT PRESENT ON EITHER OF THE SIDE RAILS
814
CONTROLLER RECEIVES A SIGNAL FROM THE PRESENCE SENSORS INDICATING THE USER'S PRESENCE ON THE AREA OF THE TREADMILL INDICATING USE
816
THE CONTROLLER DETERMINES THAT THE USER IS BACK ON THE TREAD TO USE THE TREADMILL
818
THE CONTROLLER INITIATES DISENGAGMENT OF THE BRAKE IN RESPONSE TO DETERMINING THAT THE USER IS PRESENT ON THE TREAD

FIG. 8

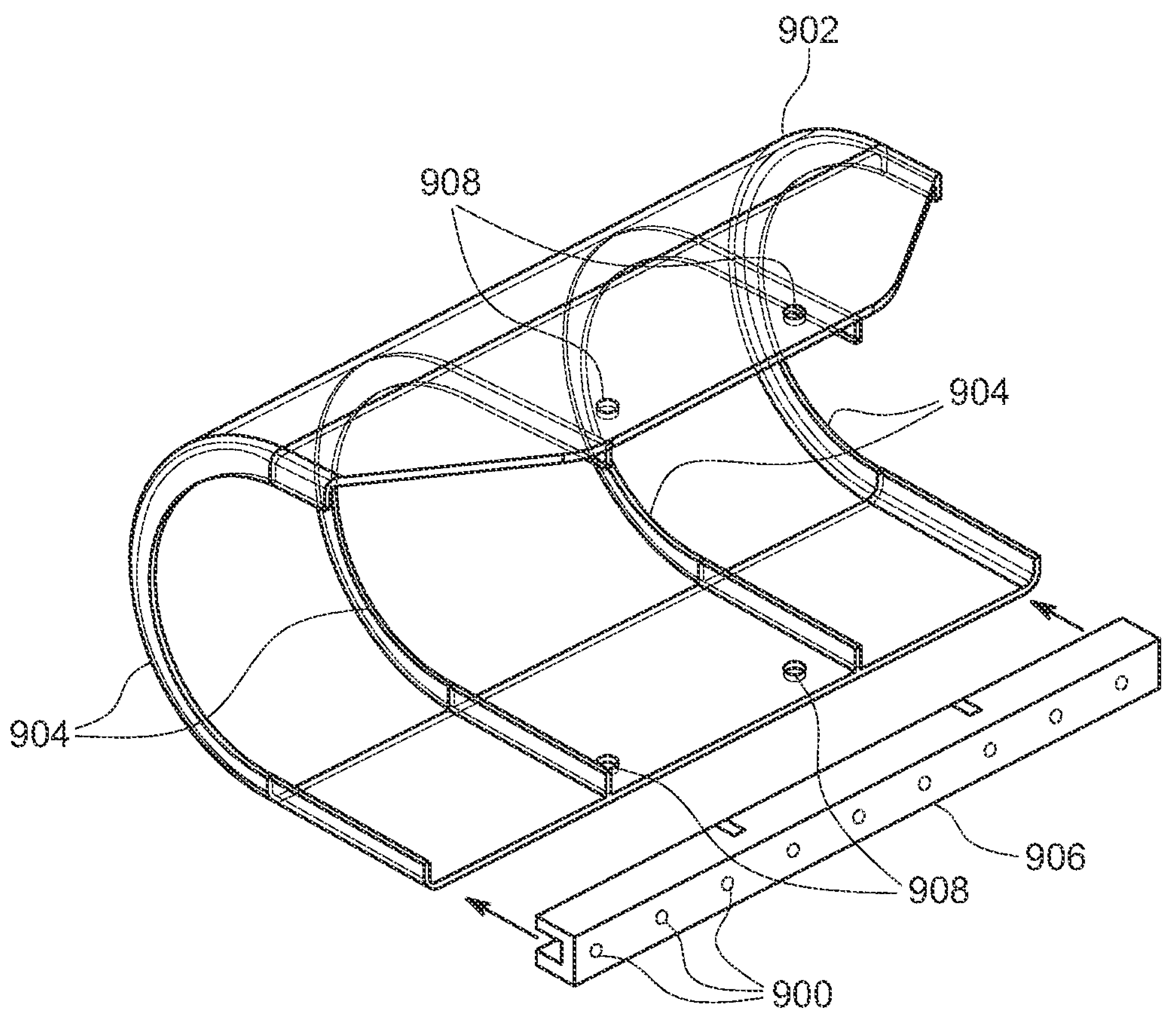


FIG. 9

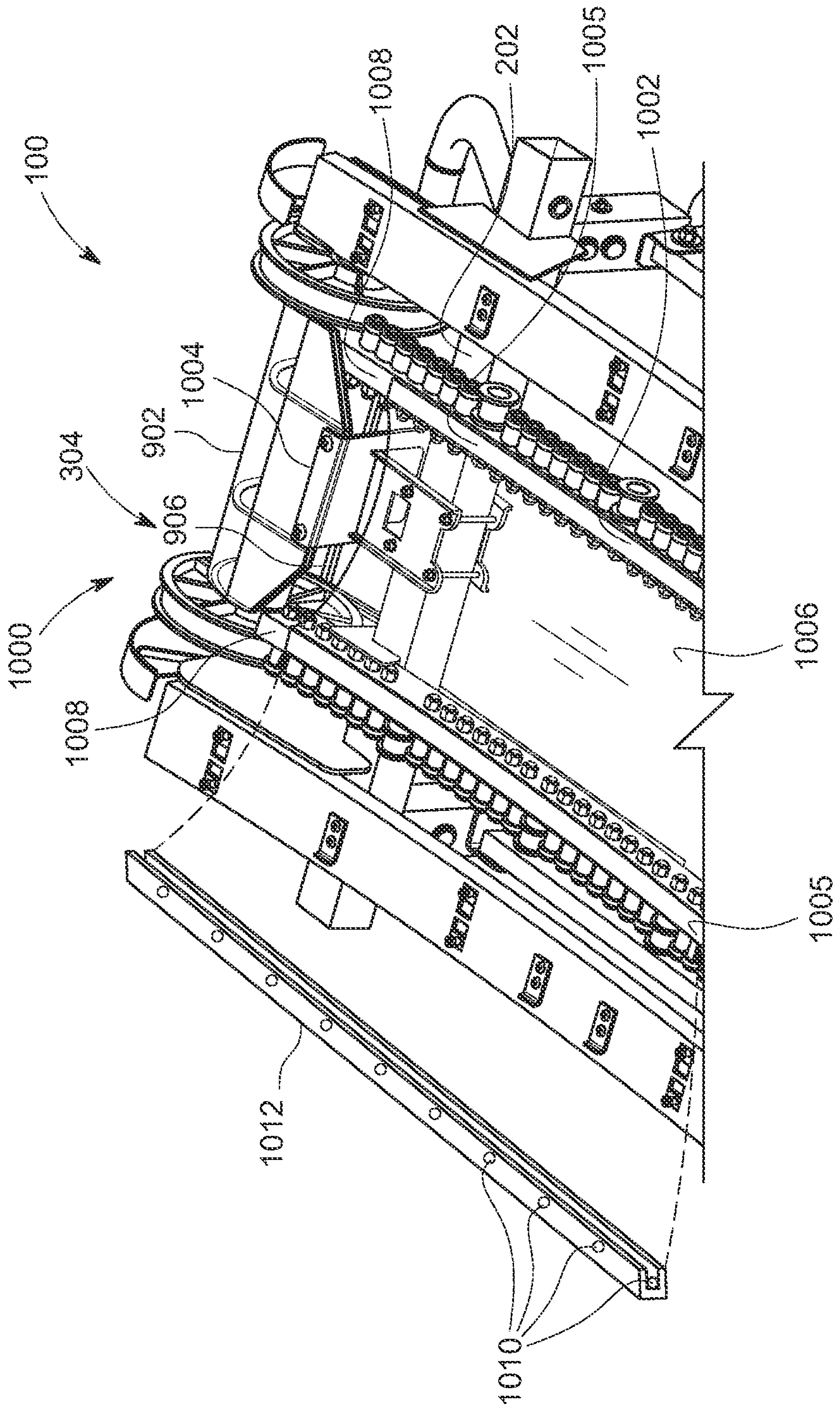

100
1000
304
906
902
1004
1008
202
1005
1002
1006
1005
1012
1010
1008

FIG. 10

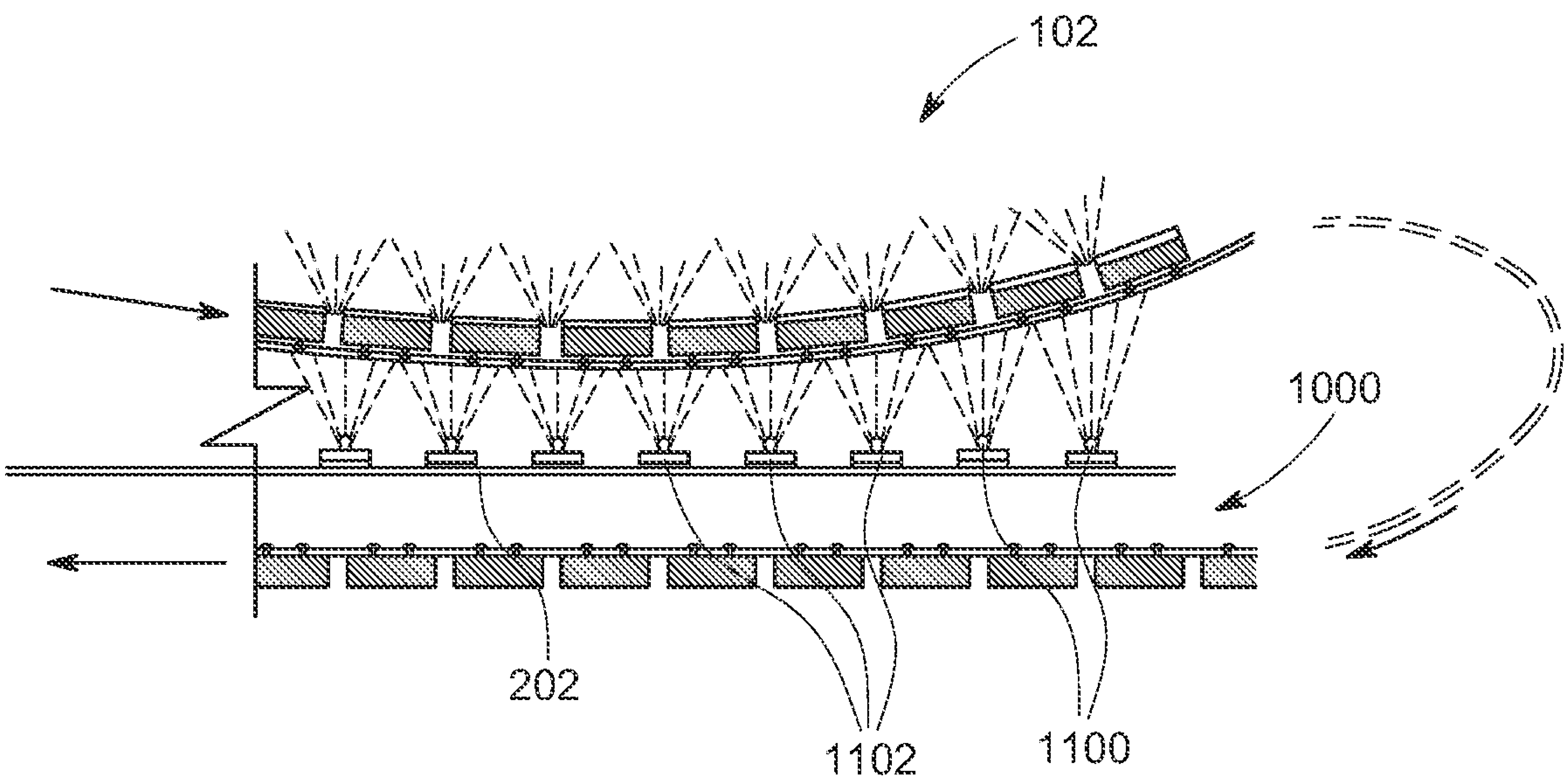


FIG. 11

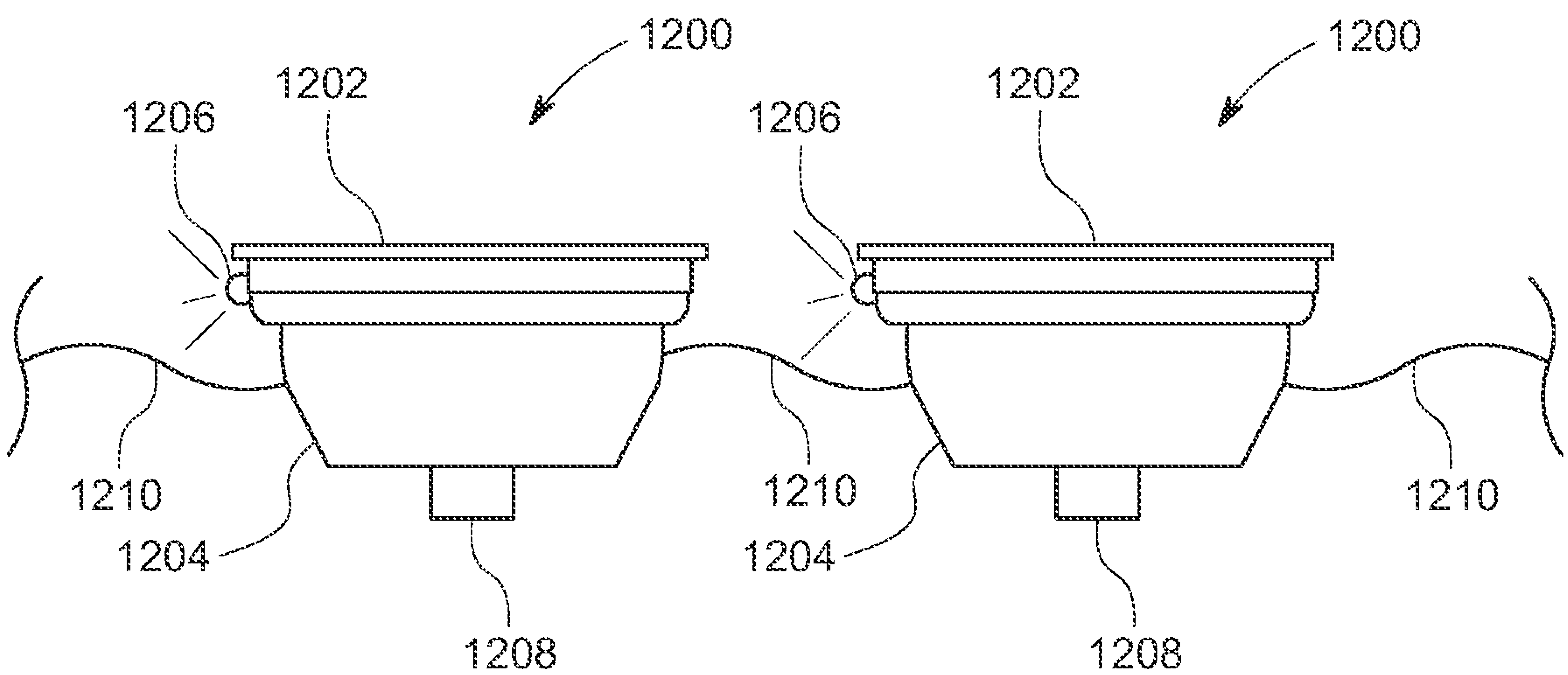

1200
1202
1206
1200
1202
1206
1210
1204
1208
1210
1204
1208
1210

FIG. 12

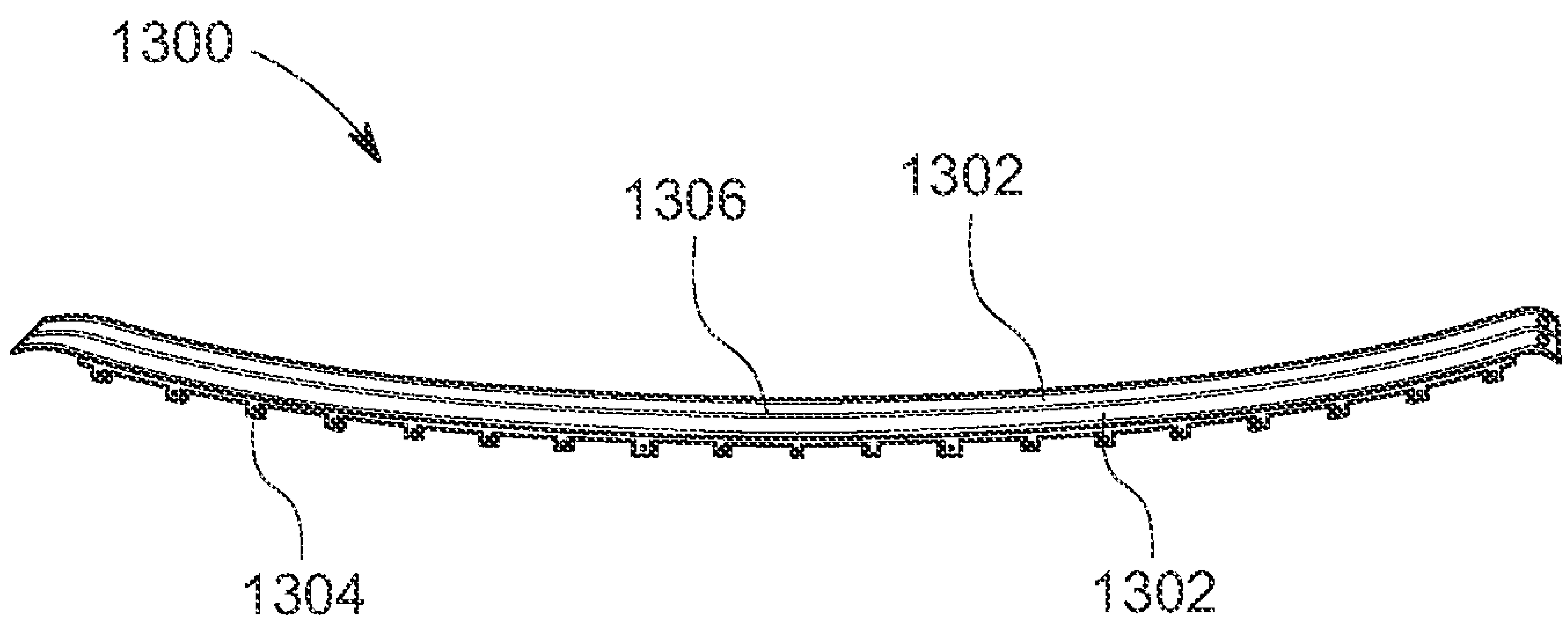

1300
1306
1302
1304
1302

FIG. 13

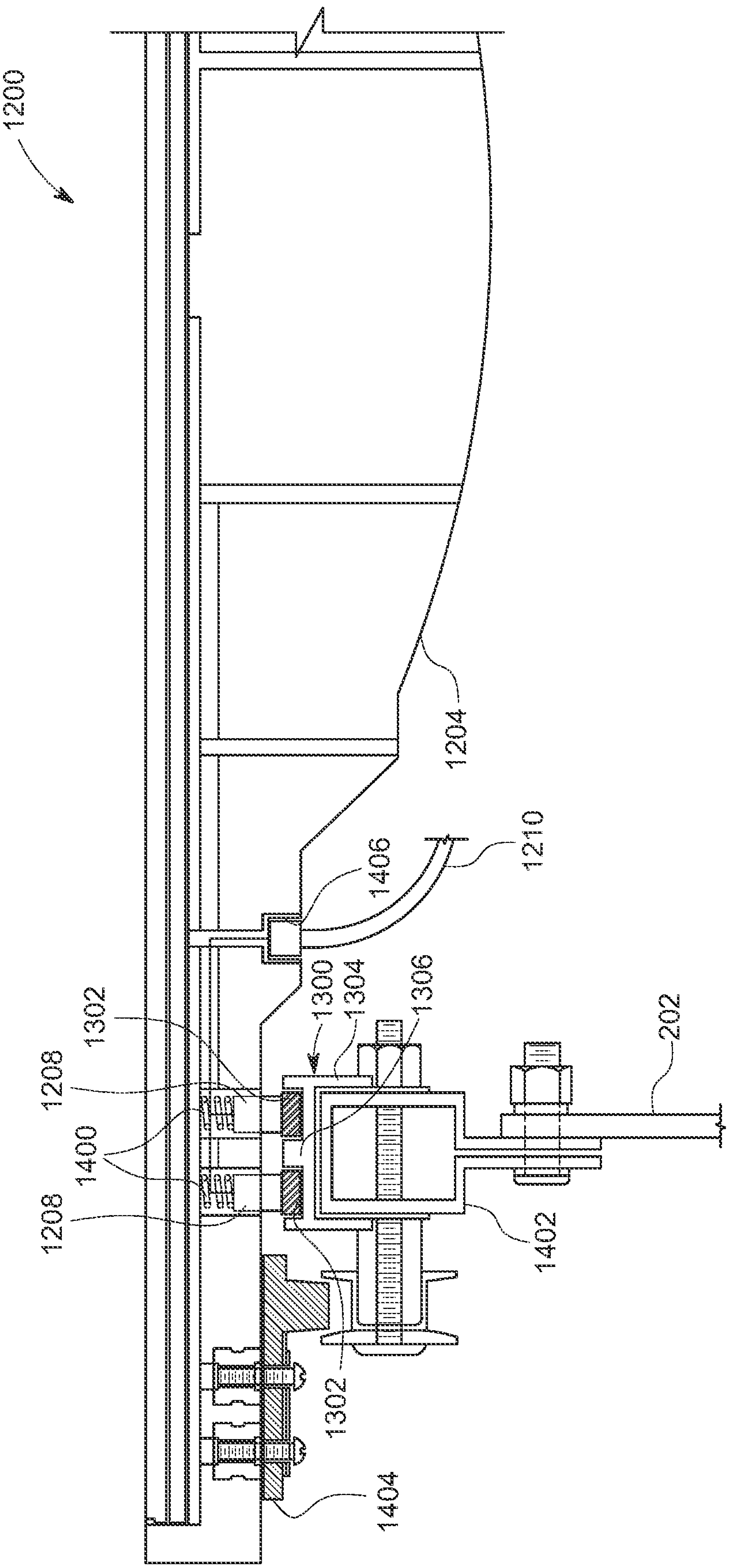

1200
1204
1210
1406
1300
1304
1306
1302
1208
1400
1208
202
1402
1302
1404

FIG. 14

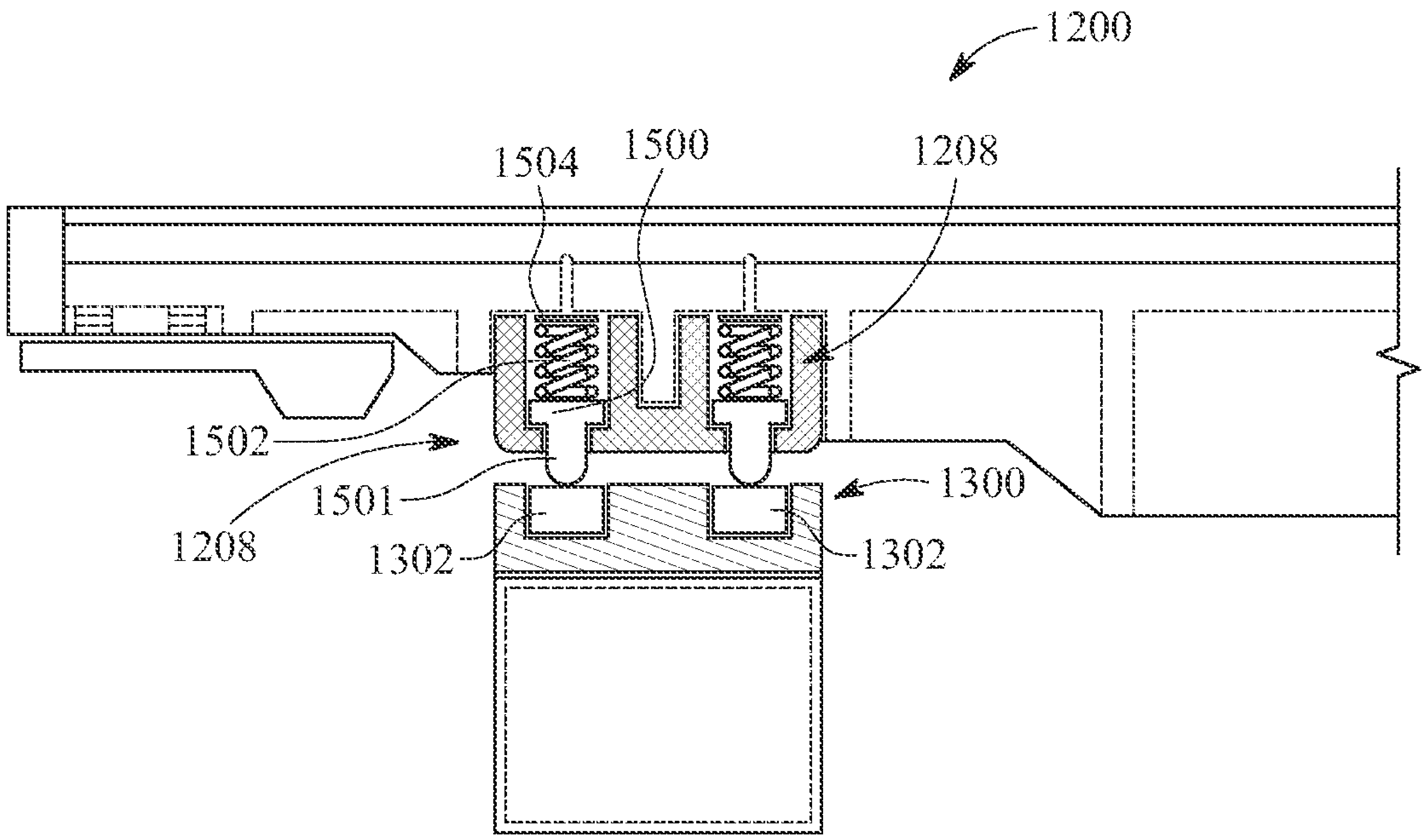


FIG. 15

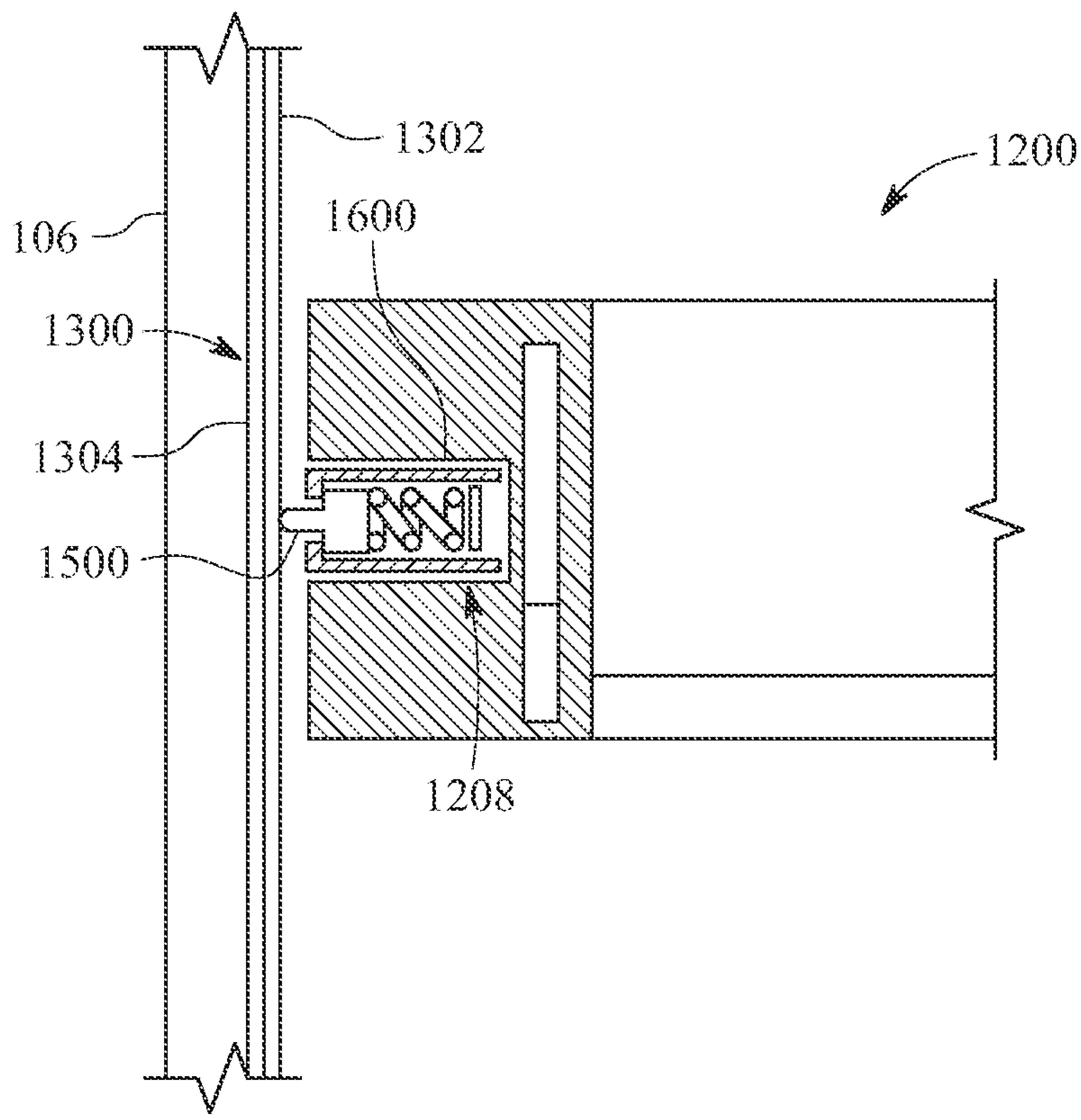


FIG. 16A

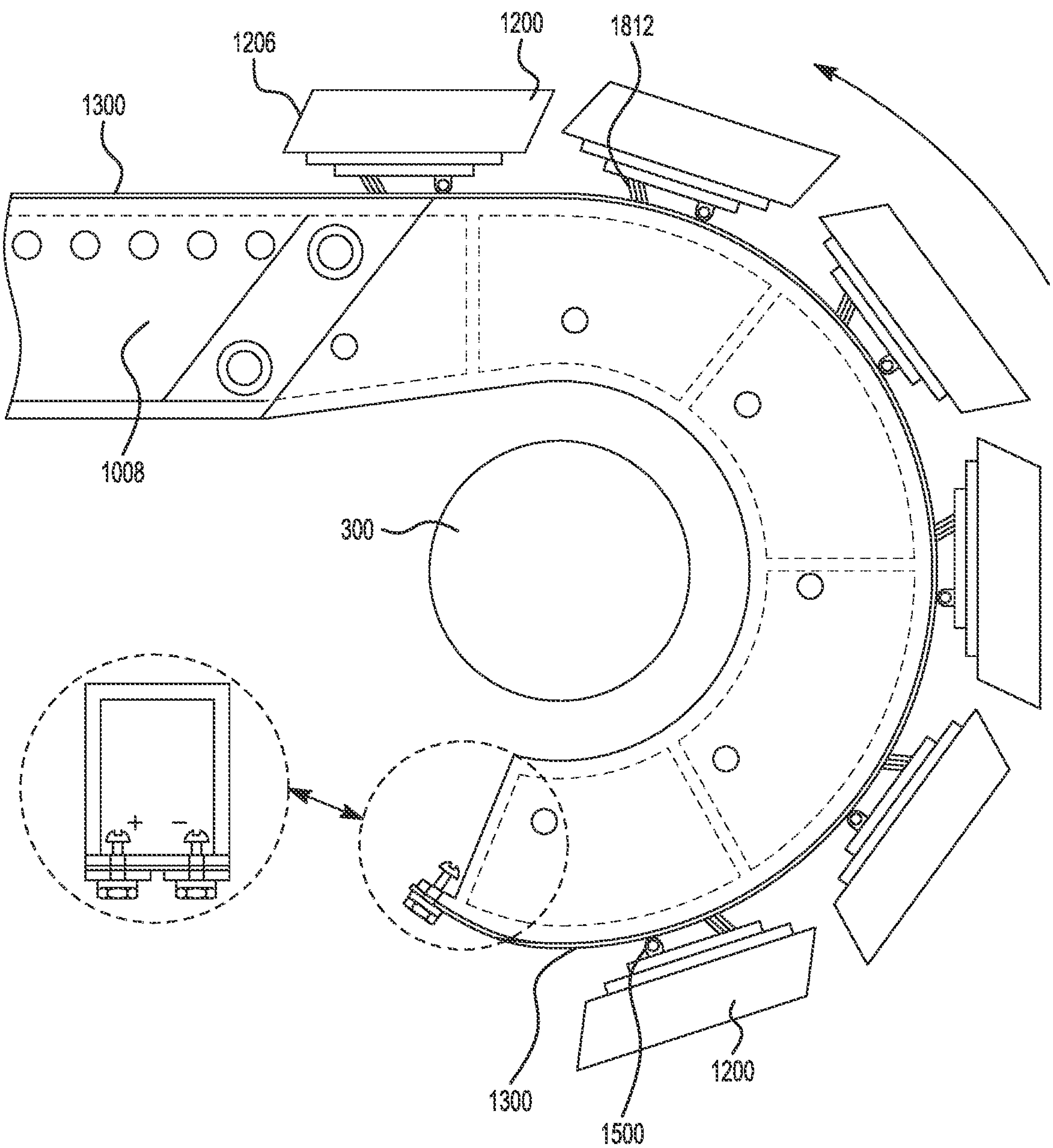


FIG. 16B

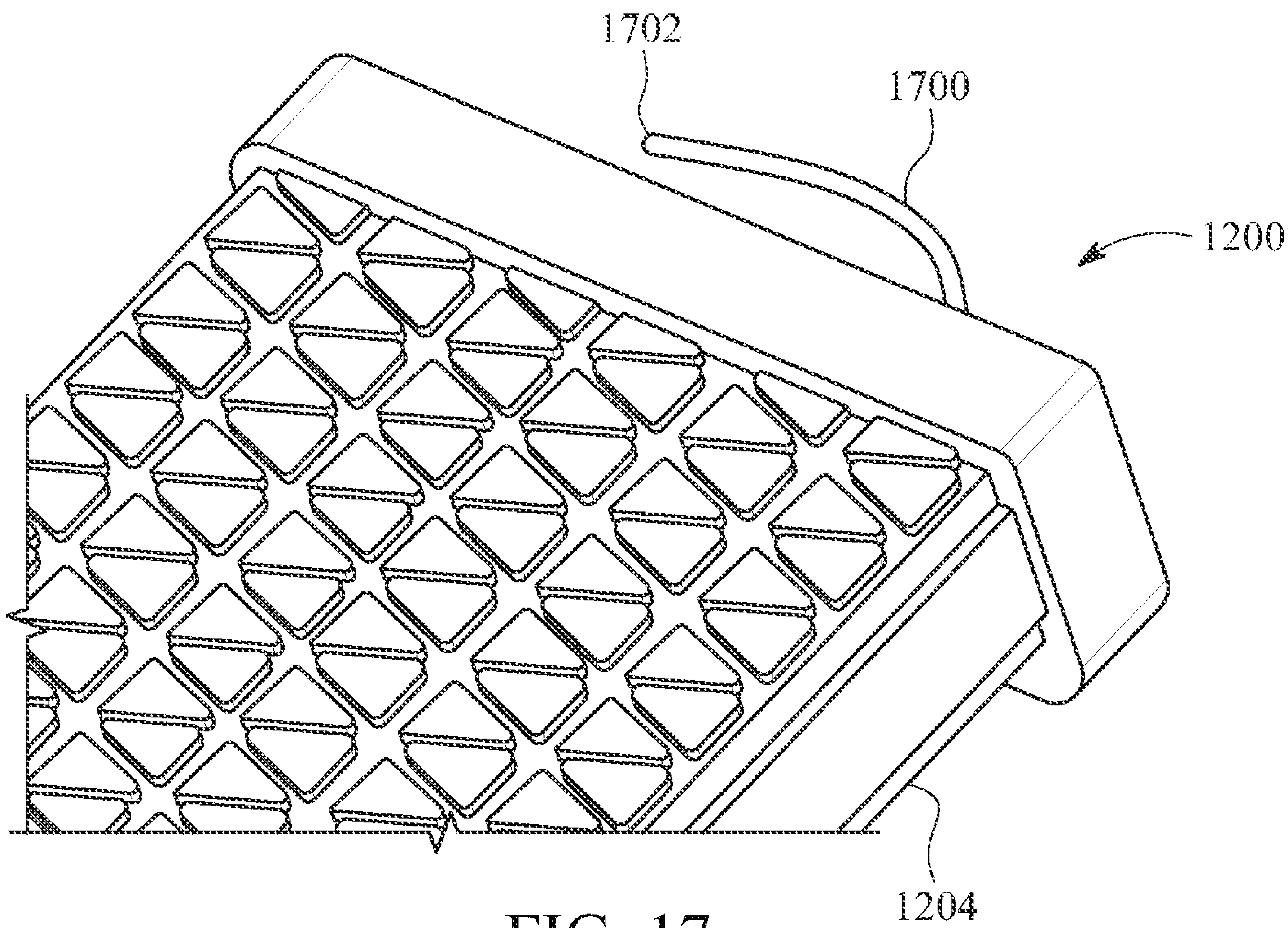


FIG. 17

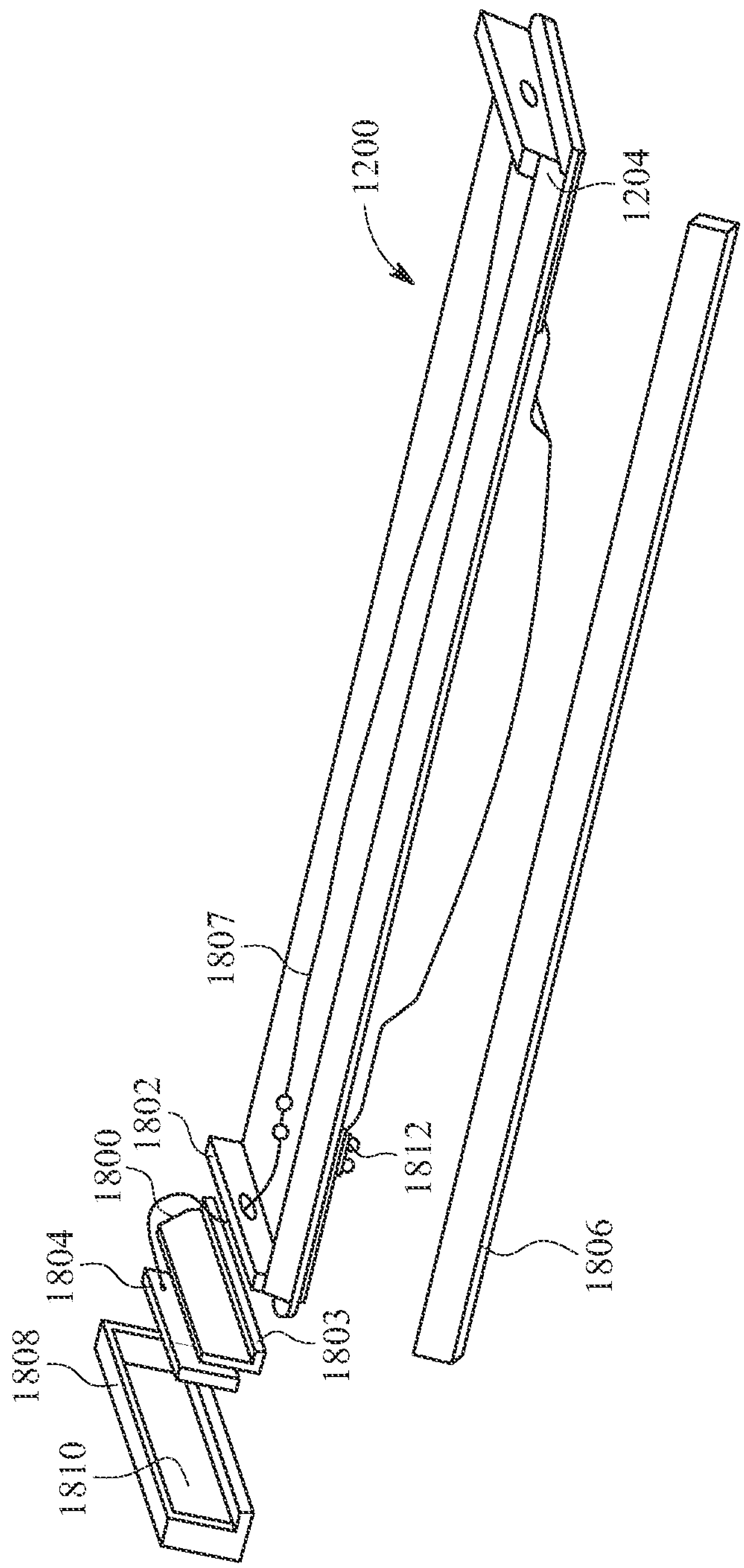


FIG. 18

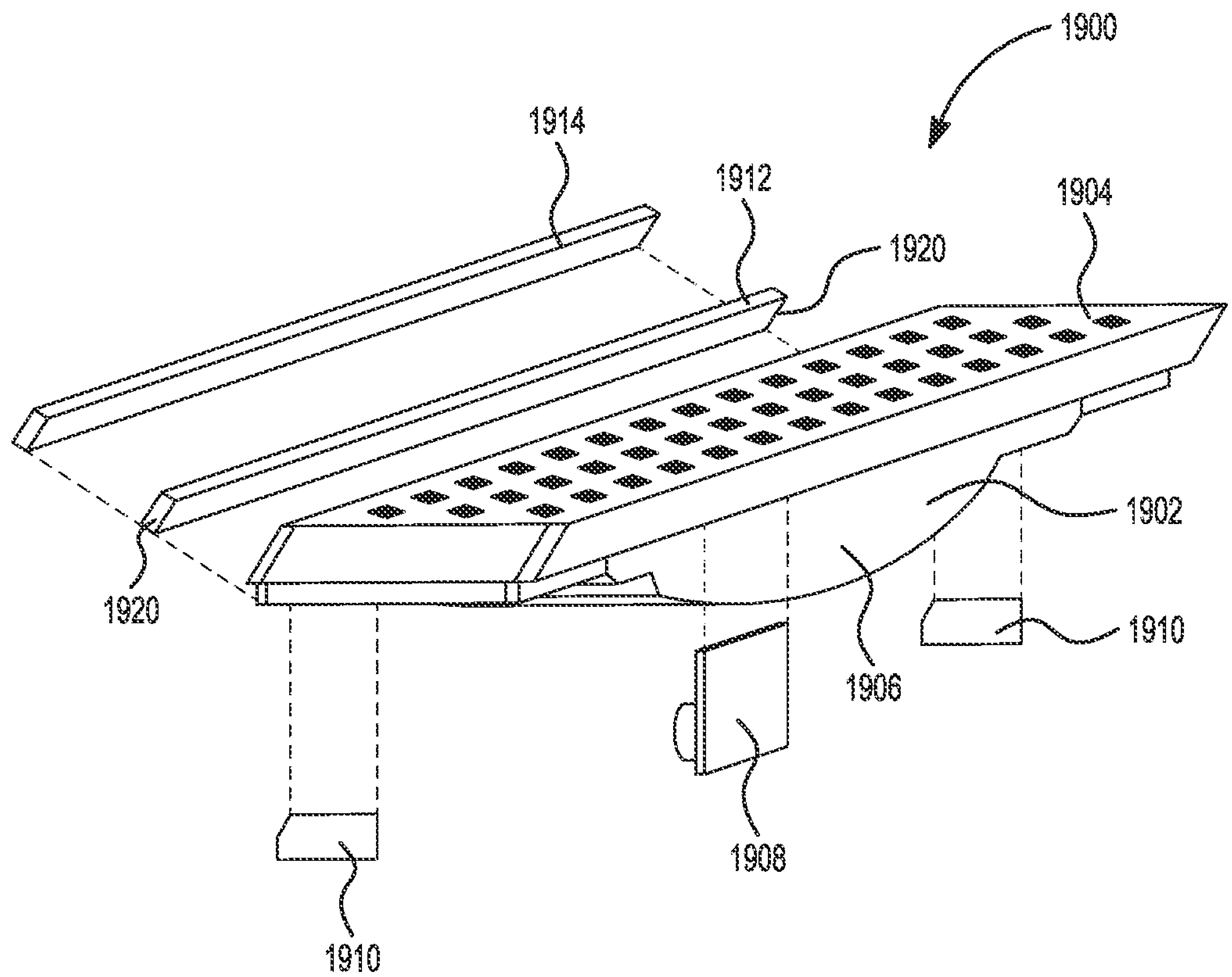


FIG. 19A

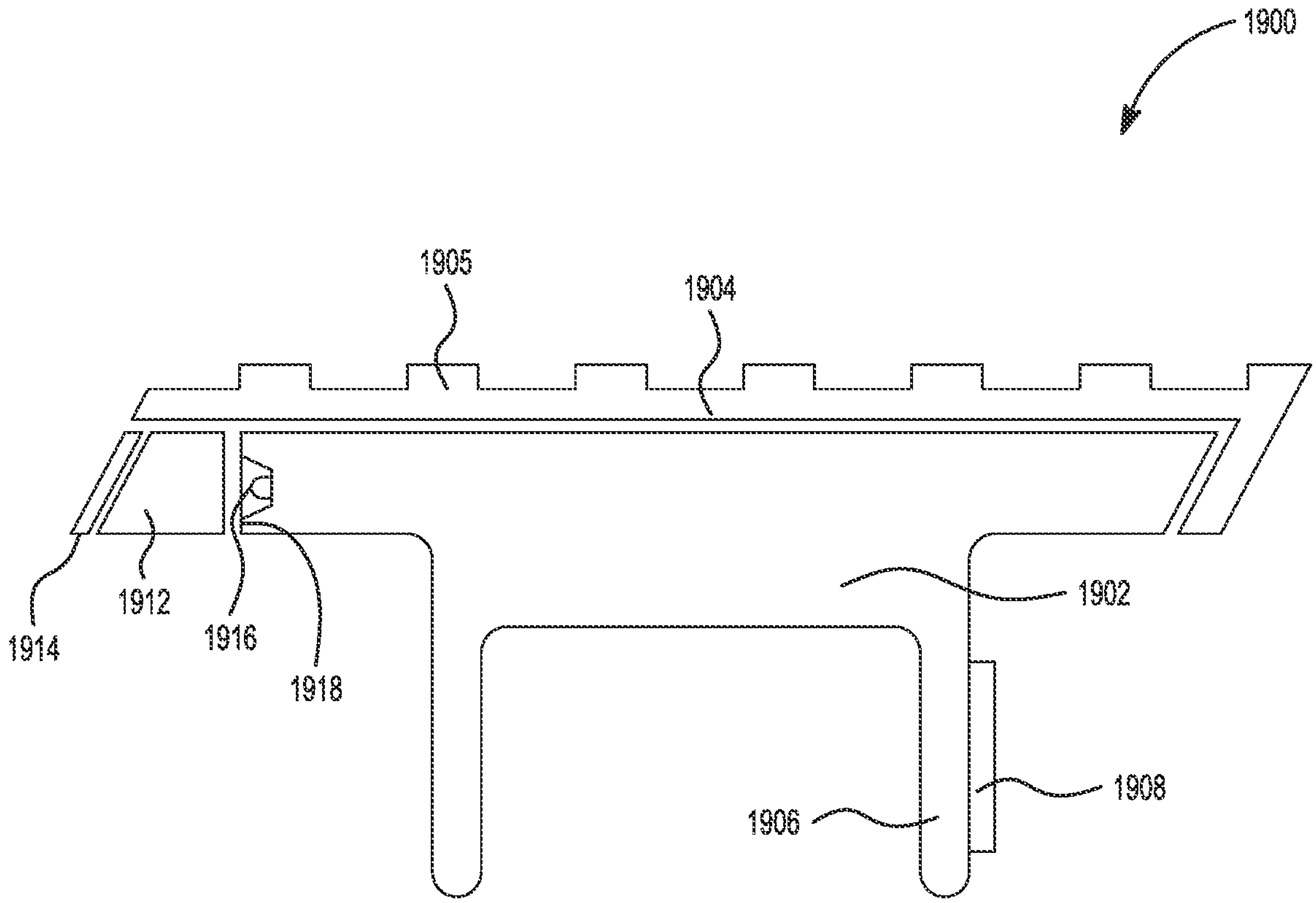


FIG. 19B

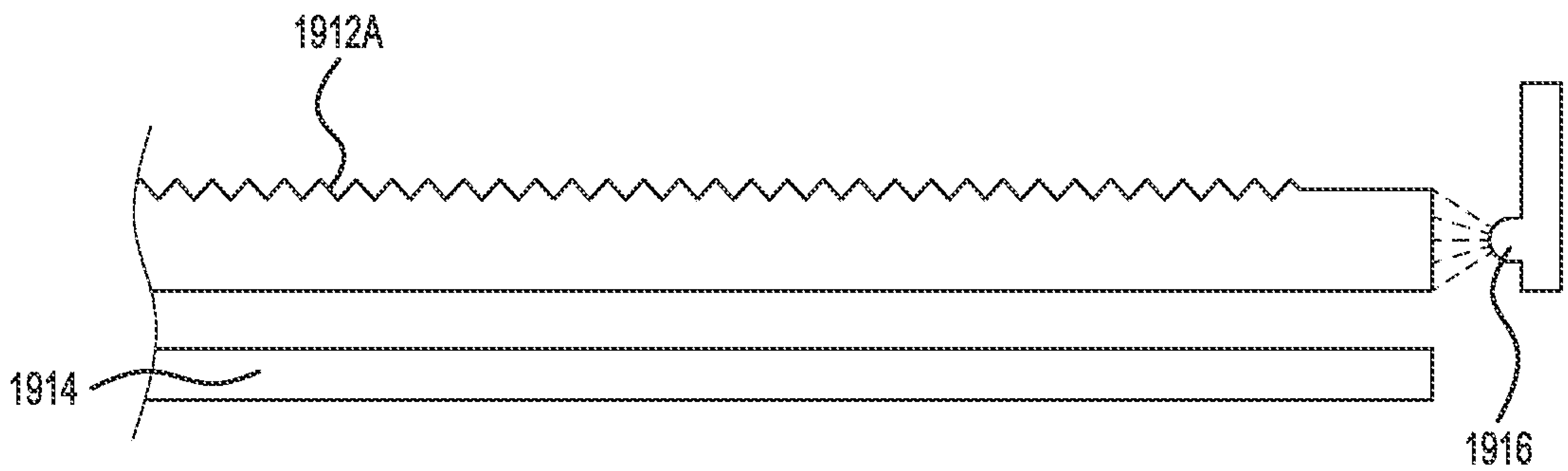


FIG. 20A

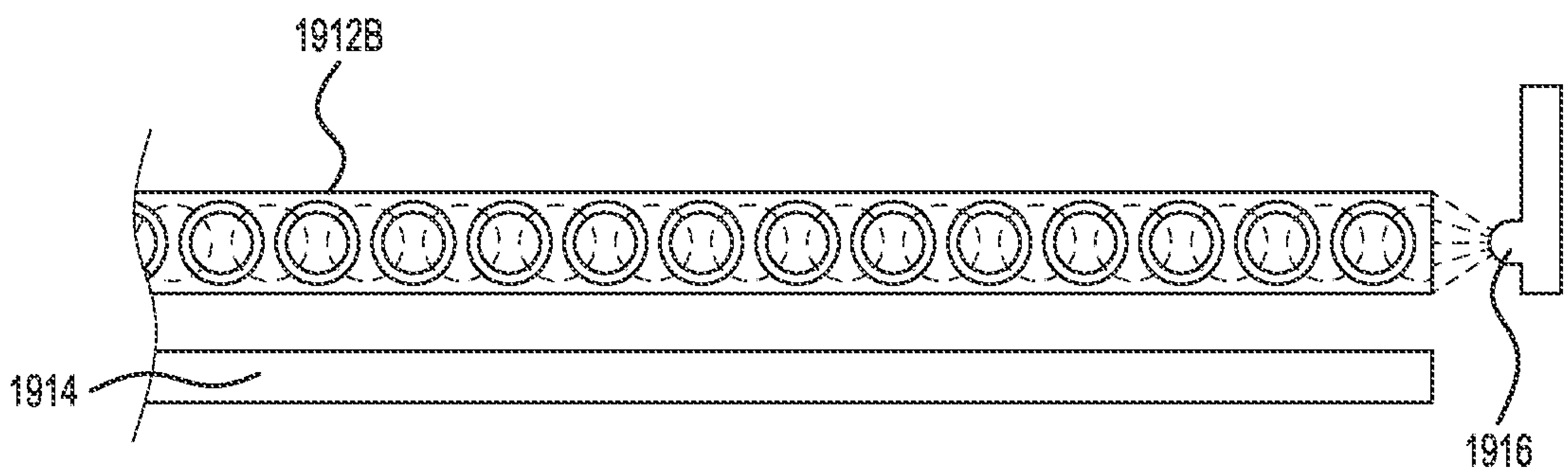


FIG. 20B

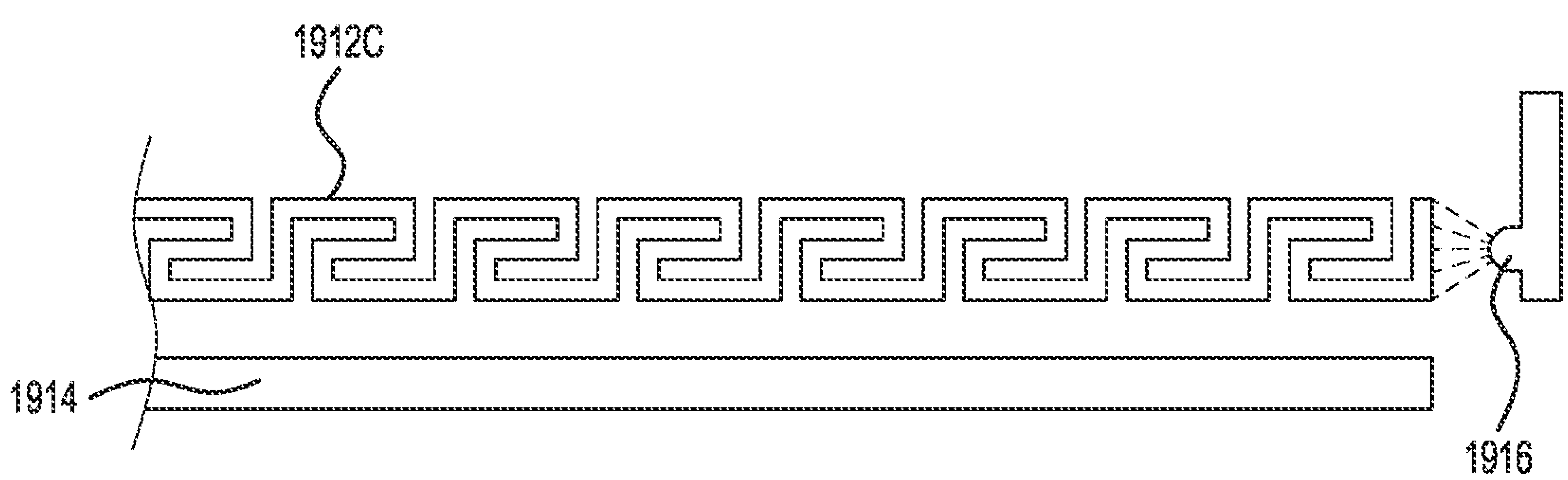


FIG. 20C

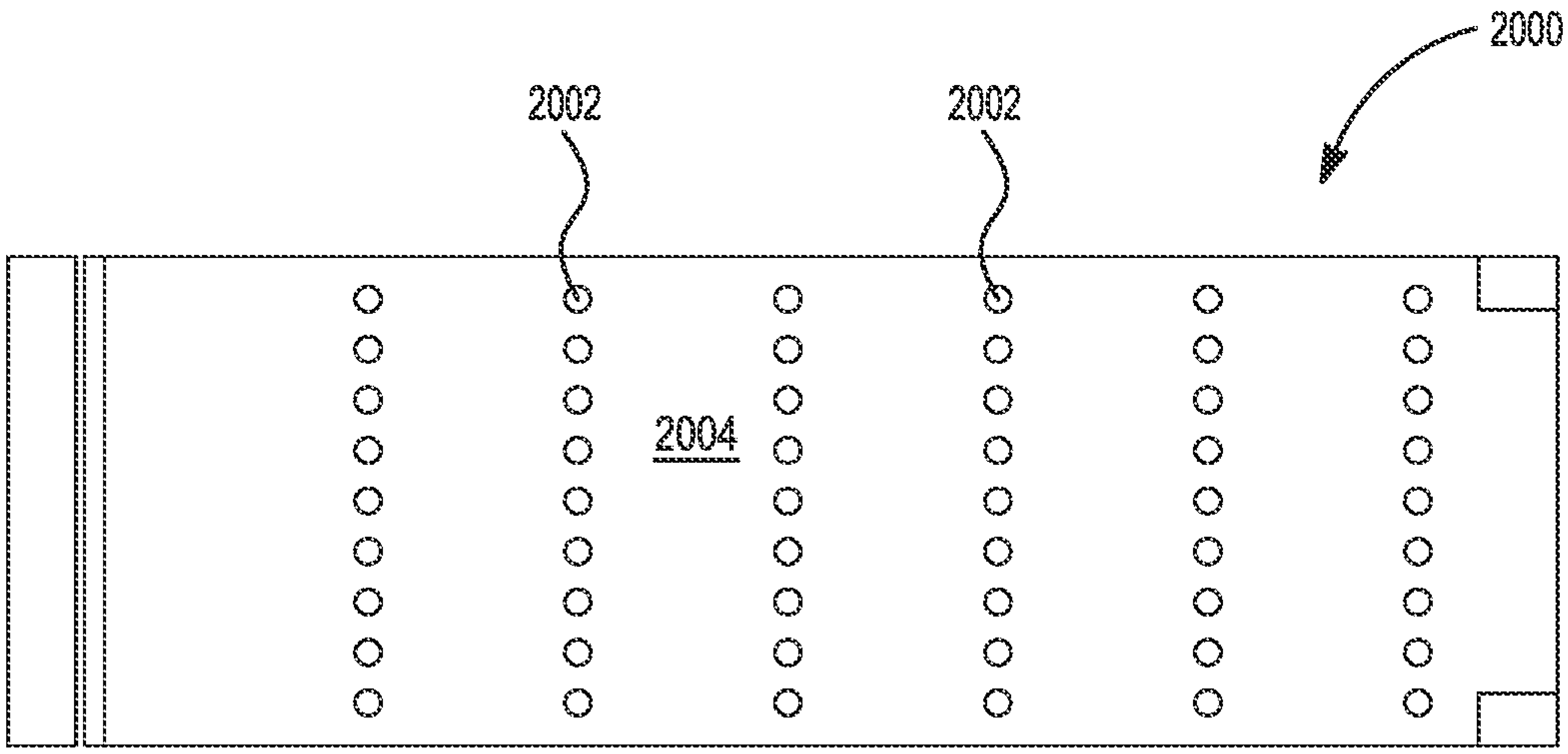


FIG. 21A

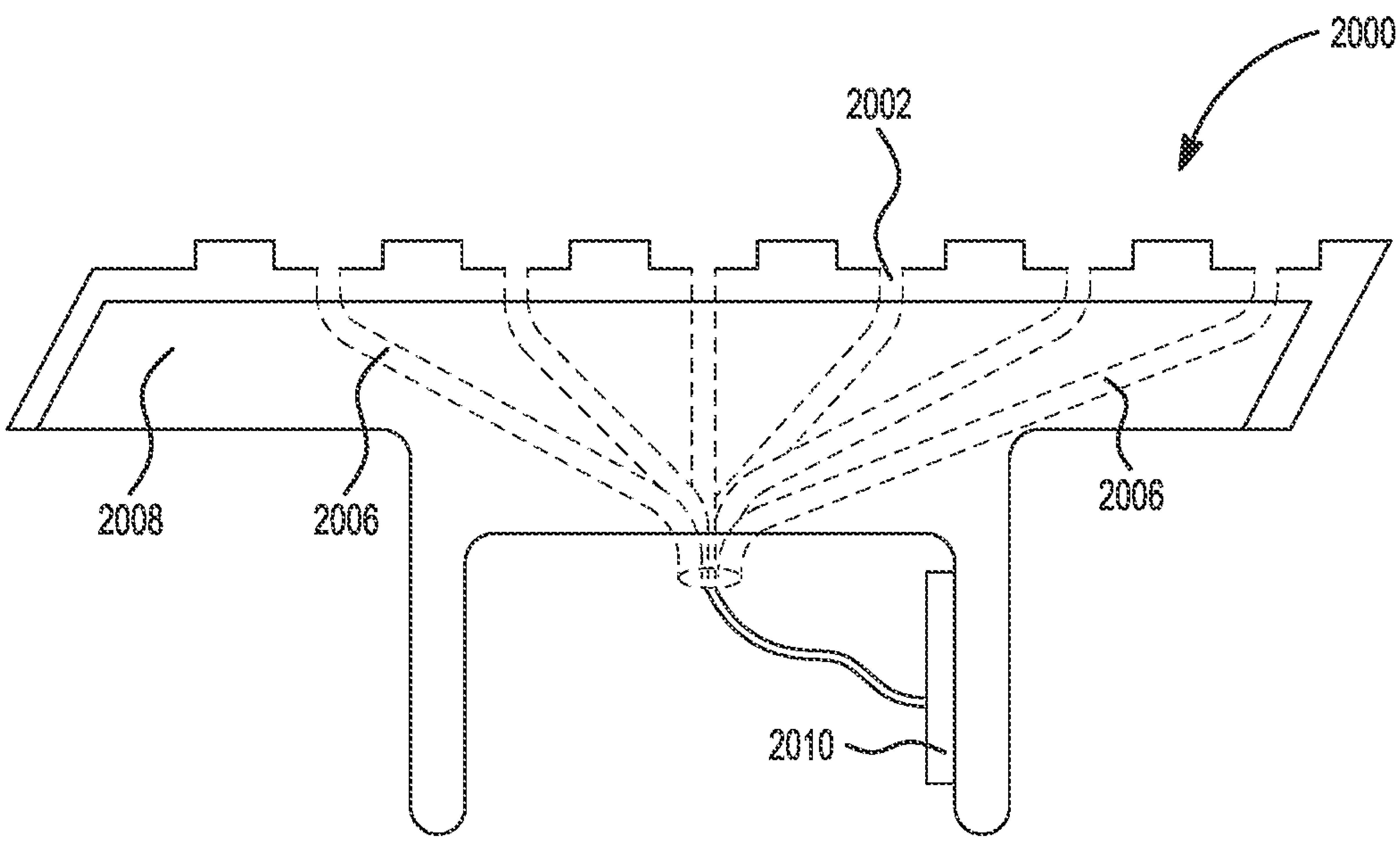


FIG. 21B

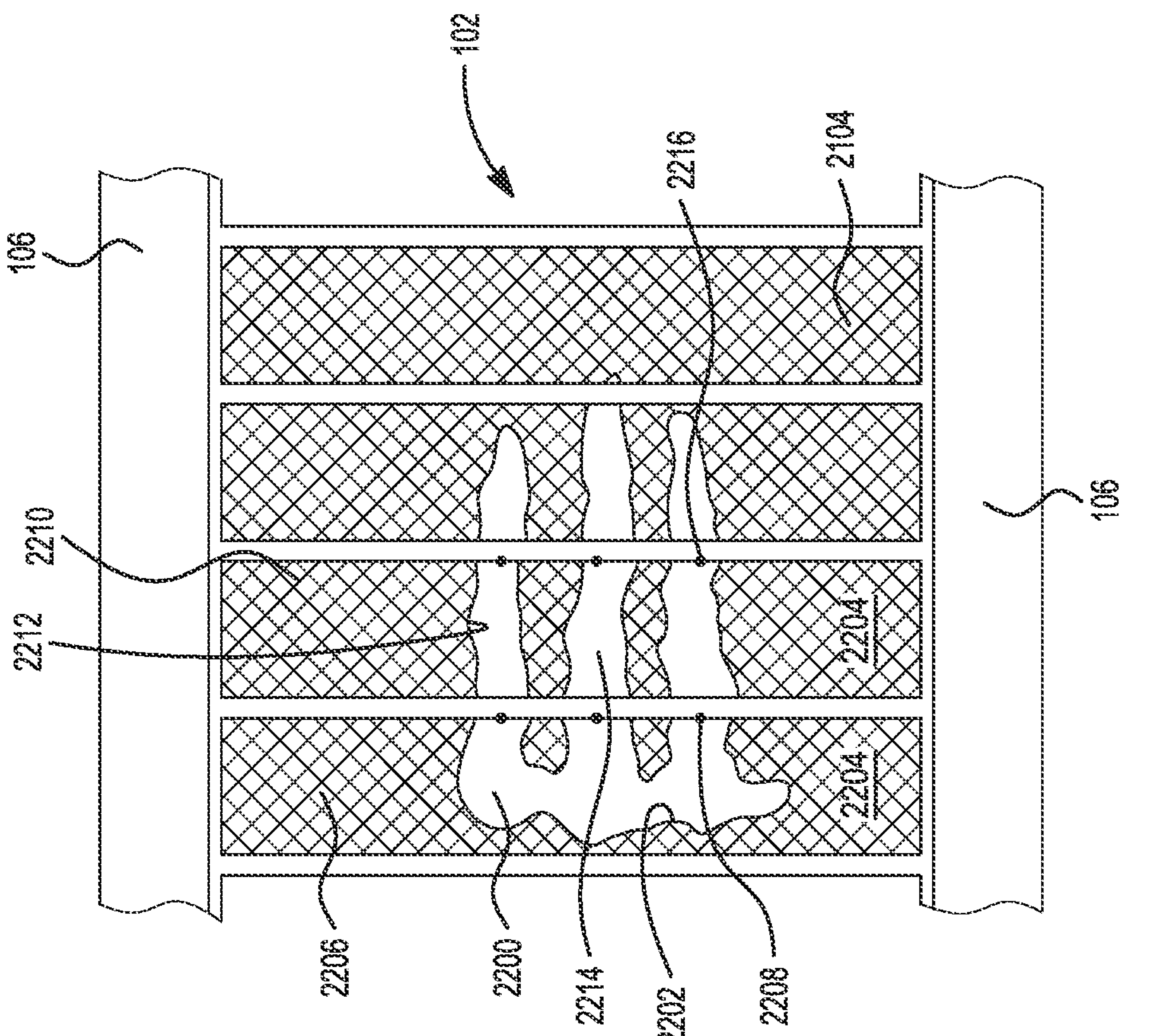


FIG. 22B

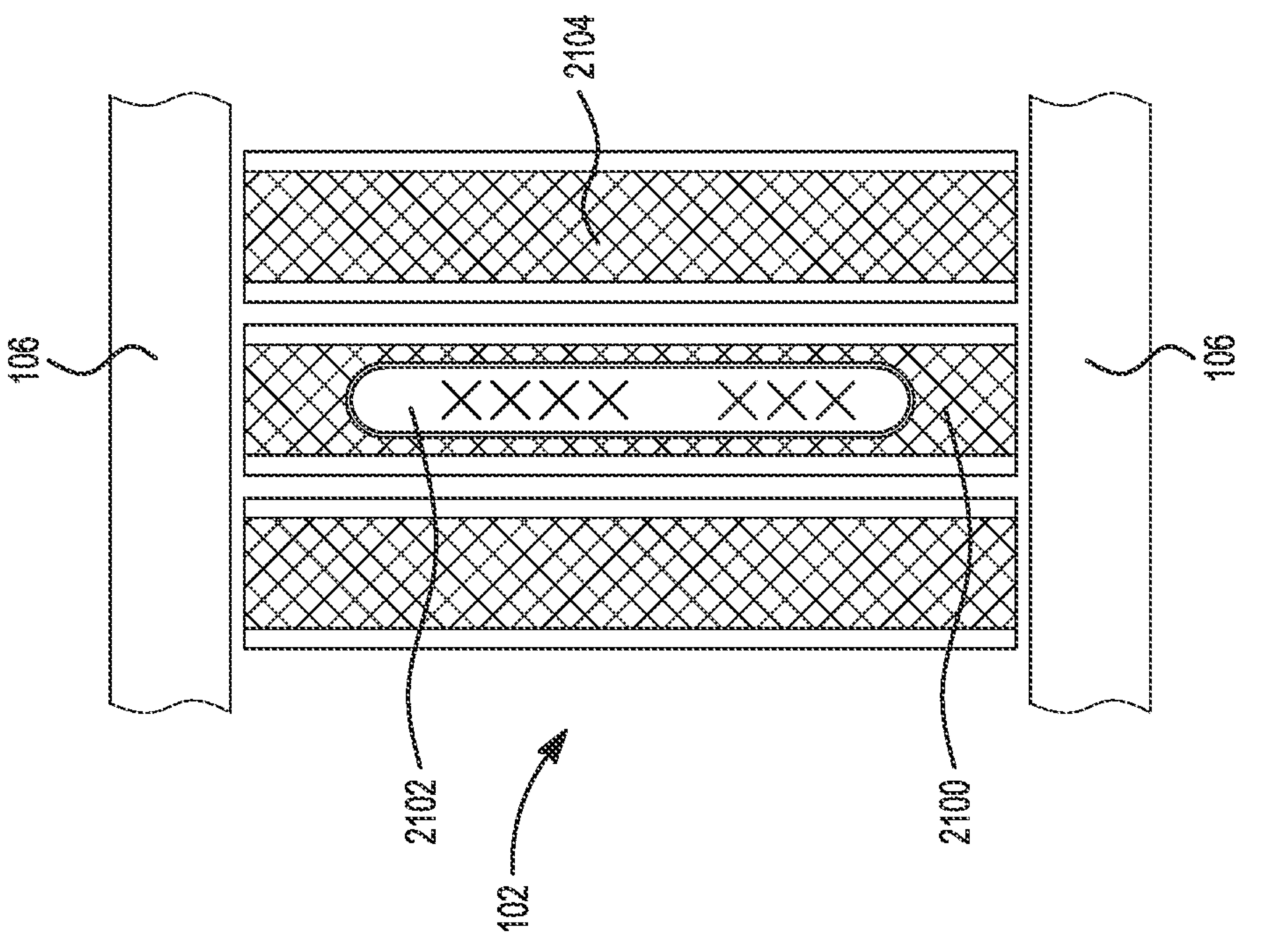


FIG. 22A

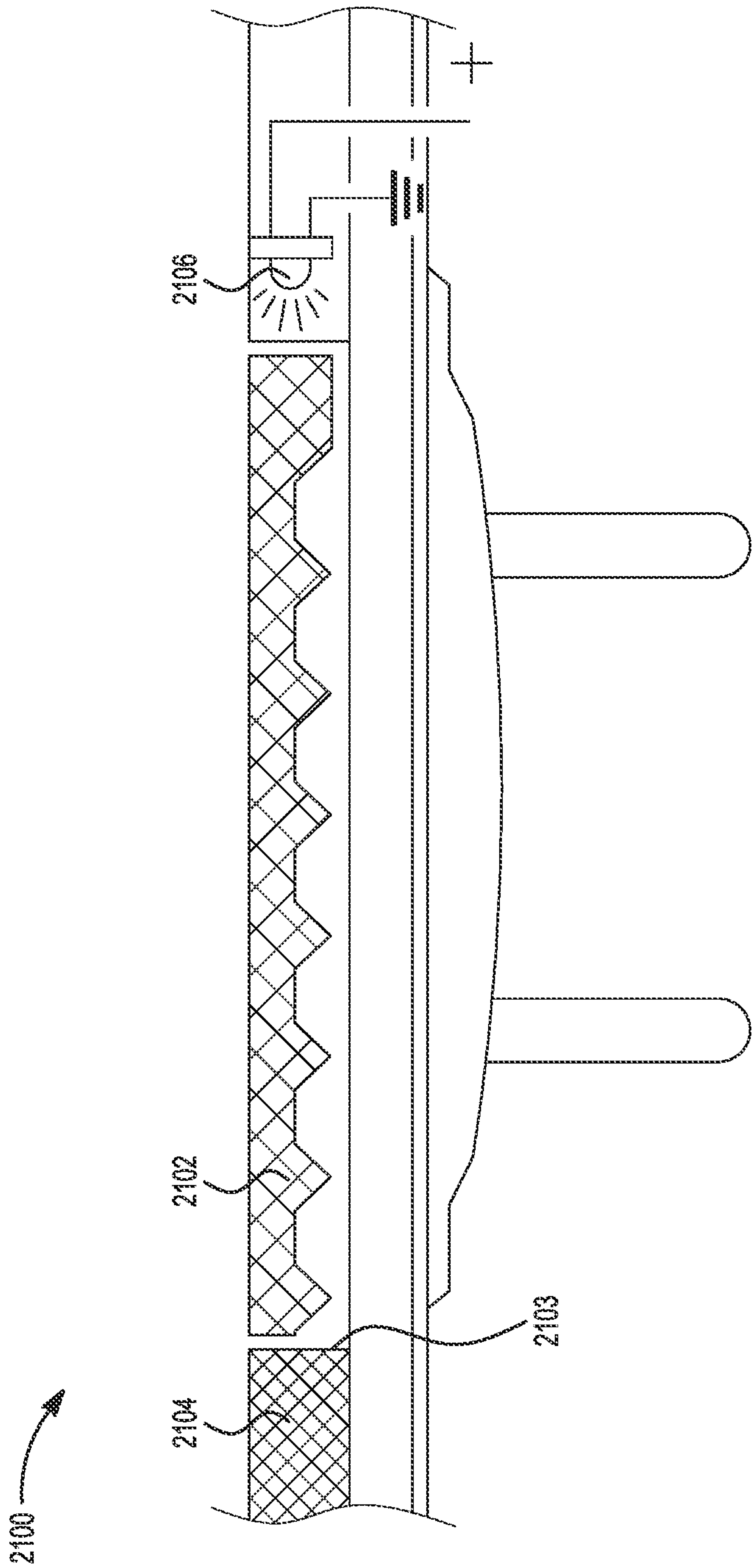
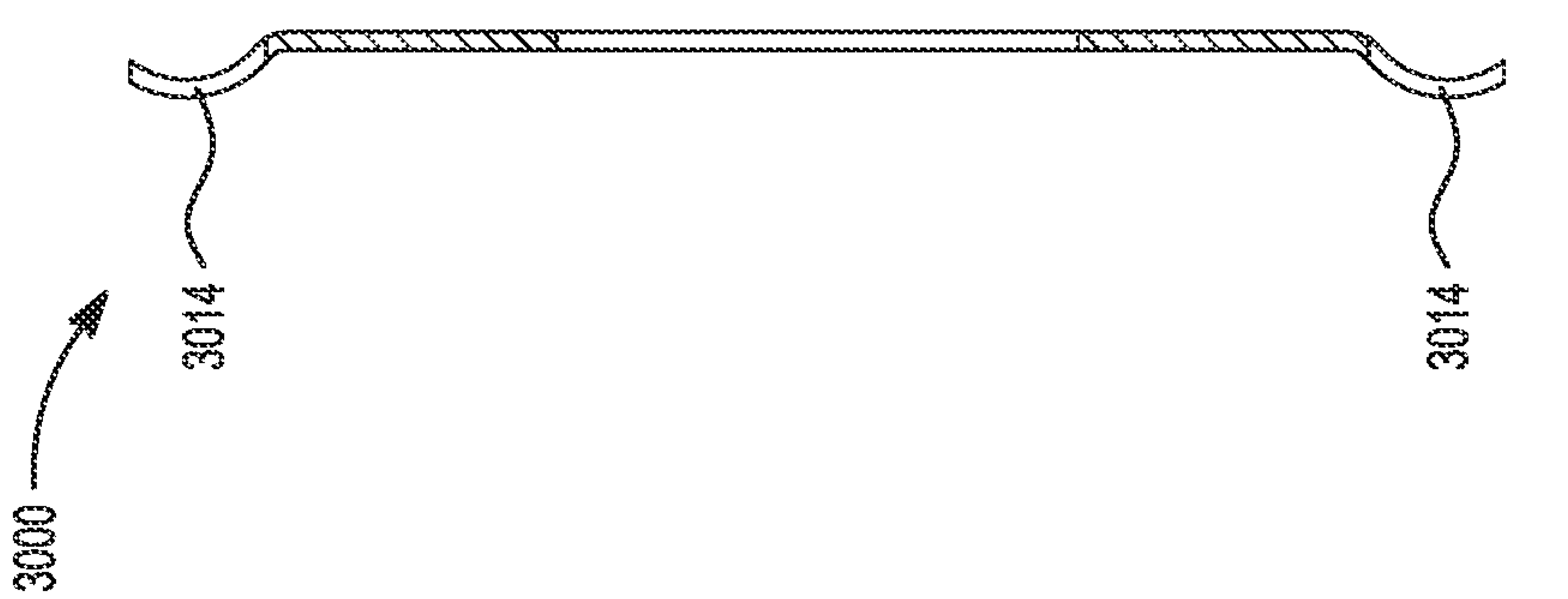


FIG. 22C



SECTION A-A
FIG. 23B

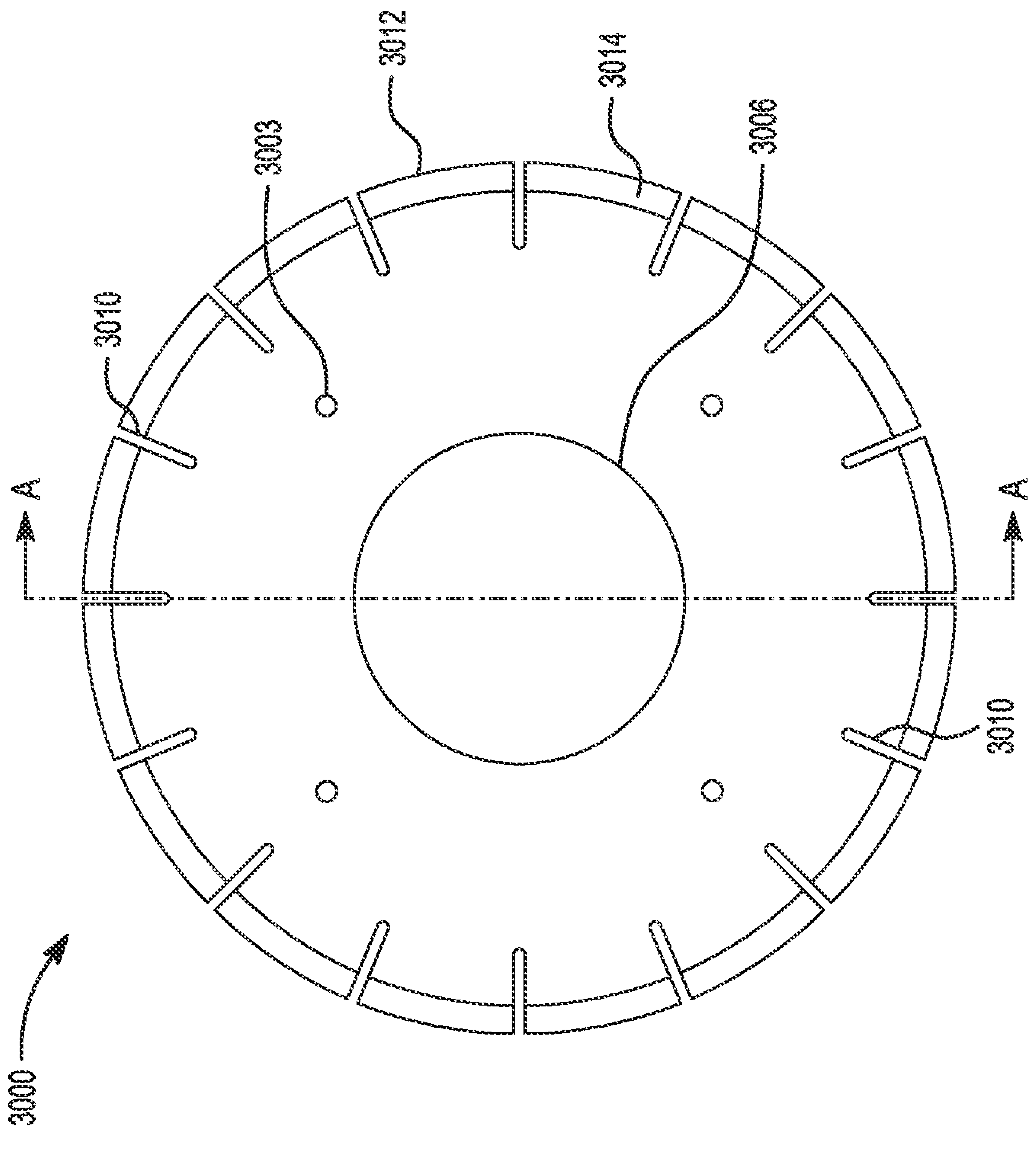


FIG. 23A

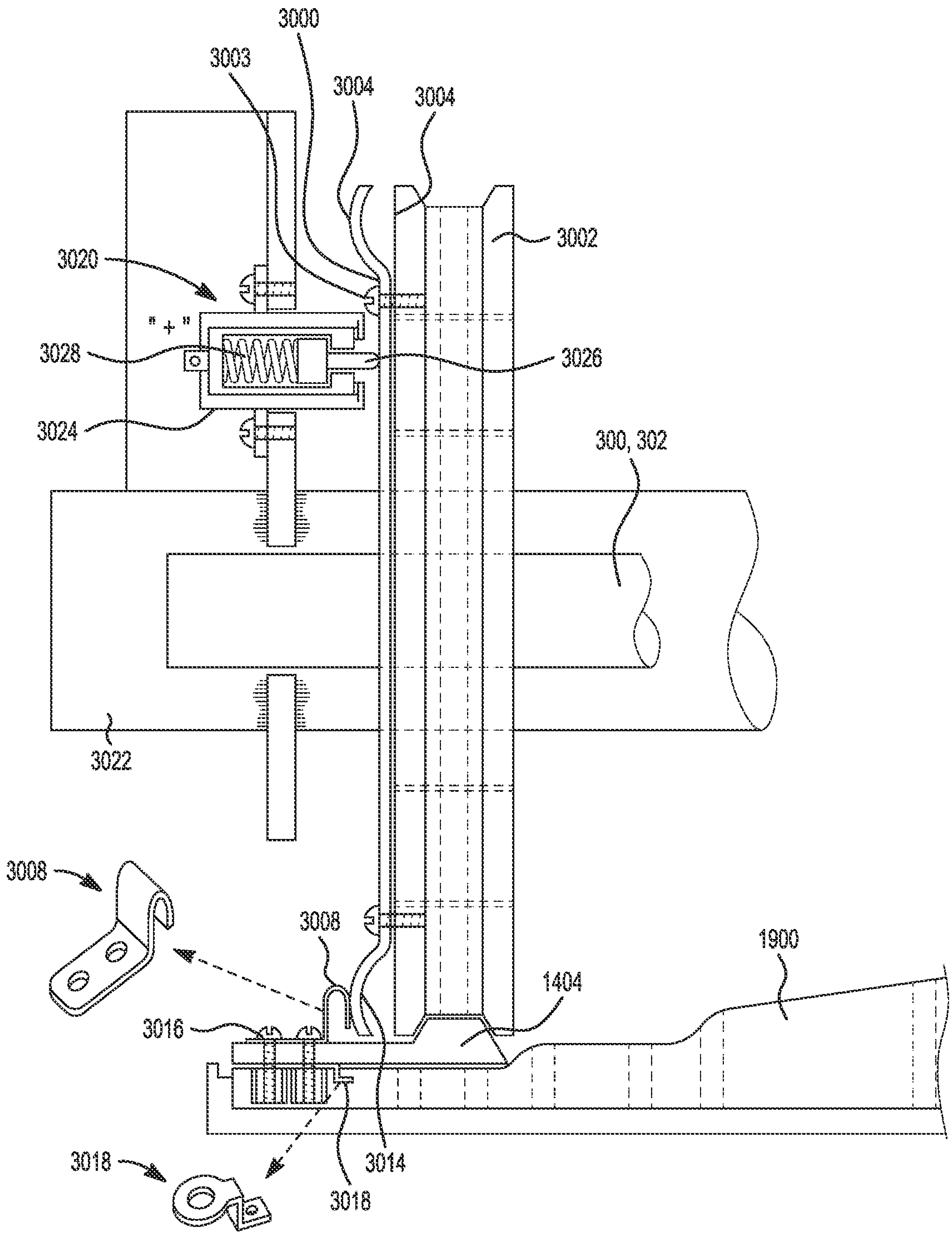

3000
3003
3004
3004
3002
3020
"+"
3028
3026
3024
300, 302
3022
3008
3008
1900
1404
3016
3014
3018
3018

FIG. 24

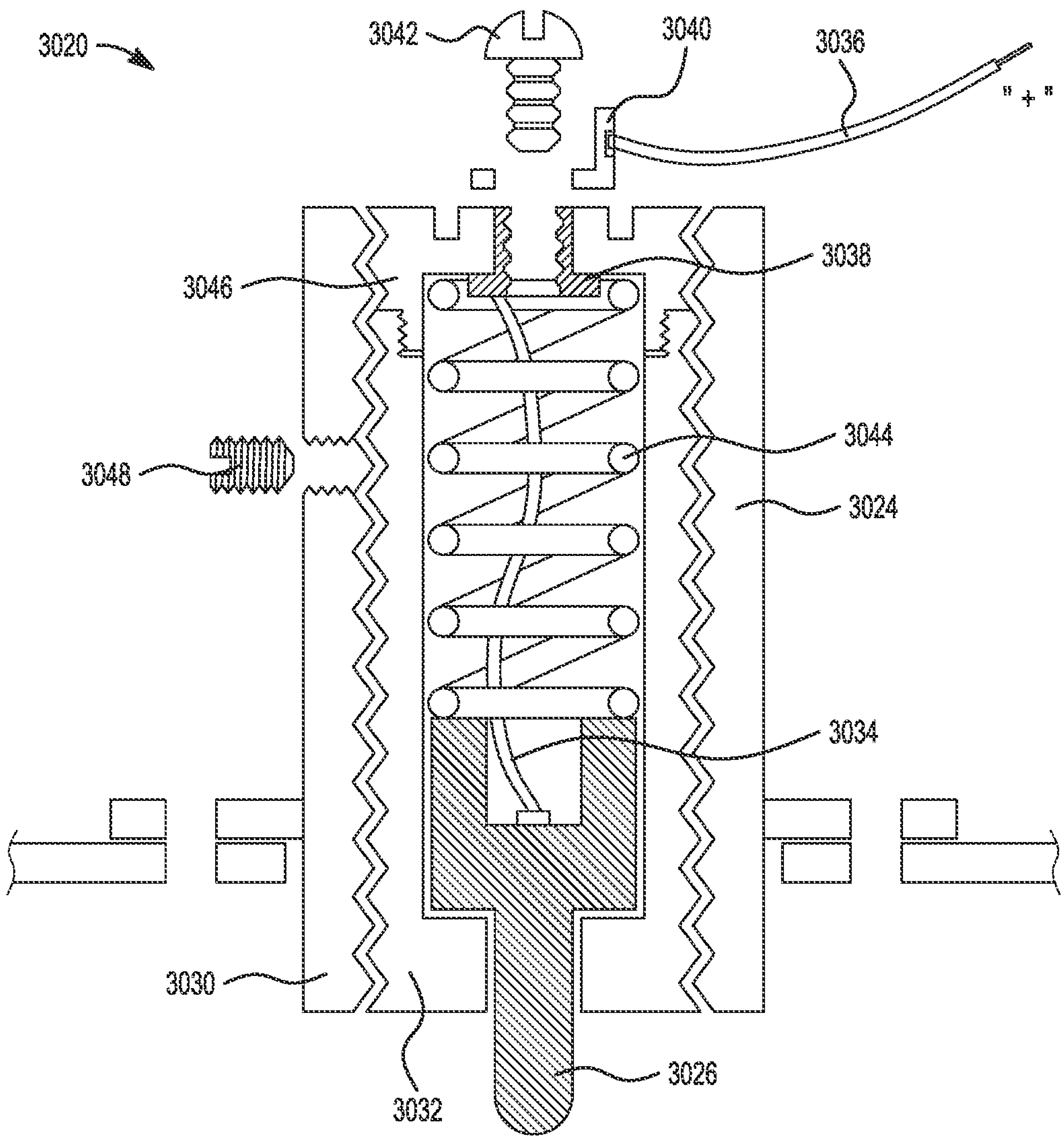

3020
3042
3040
3036
"+"
3038
3046
3044
3048
3024
3034
3030
3032
3026

FIG. 25

TREADMILL WITH LIGHTED SLATS

CROSS REFERENCE TO RELATED APPLICATIONS

This application is a continuation-in-part of International Patent Application No. PCT/US2020/017447, filed Feb. 10, 2020, which claims priority to U.S. Provisional Application Ser. No. 62/919,155, filed Feb. 28, 2019 and U.S. patent application Ser. No. 16/418,234, filed May 21, 2019, now U.S. Pat. No. 10,556,168, the contents of each herein incorporated by reference.

TECHNICAL FIELD

This disclosure relates to exercise equipment including motor driven and manual treadmills and to improvements thereof, and in particular, to exercise equipment with a slatted tread, and lighting systems mounted on the treads.

BACKGROUND

Exercise treadmills allow people to walk, jog, run, or sprint on a stationary machine with a moving tread. Treadmill treads can include a continuous belt or a slatted belt. The treads of both motorized treadmills that move the tread using a motor and manual treadmills that rely on the user to move the tread continue to move once a user of the treadmill has stepped off the tread. The moving tread can make it difficult for the user to continue using the treadmill once the user continues to operate the treadmill. Additionally, other individuals nearby the moving tread may step onto the tread unaware that it is moving. Motorized and manual treadmills also allow unauthorized users such as children or animals to step onto the tread during or after use by an authorized user. Further, motorized and manual treadmills do not provide an alert to nearby individuals that the tread is moving.

Motorized and manual treadmills also often display information to users using a display screen. Such displays may be ineffective means to relay information to the user of the treadmill or to observers of the user while the user is operating the treadmill.

SUMMARY

One aspect of this disclosure is a treadmill including a lighting system. The treadmill includes a tread that rotates around a front axle and a rear axle, wherein the tread comprises slats each having a tread surface and an underside. The lighting system comprises a light positioned on at least one slat, wherein the light is configured to emit light from the slat or through adjacent slats. A controller is in communication with the light and configured to control the light.

Another embodiment of a lighting system for a treadmill includes a tread comprising slats each having a tread surface, a leading edge and an underside, each slat attached at longitudinal ends to a respective belt that rotates on bearings around a front axle and a rear axle. The lighting system comprises a light attached to the leading edge of a respective slat such that one or more slats is illuminated from the leading edge. A controller is in communication with each light and configured to control at least one of on/off, color, brightness, and light emission frequency of each light.

The lighting system embodiments can further comprise a power rail positioned within the treadmill and extending along at least a portion of a length of the tread, wherein the

power rail receives power from a power source. A contactor is attached to the underside of each slat, the power rail positioned such that each contactor contacts the power rail while the tread rotates, the contactor configured to supply power to the light when in contact with the power rail.

Also disclosed is a treadmill having a tread comprising multiple slats is configured to rotate around a front axle and a rear axle of the treadmill, wherein at least one of the multiple slats is a lighted slat. The lighted slat comprises a slat base having an upper surface, a leading edge and an underside. A light is attached to the slat base. The treadmill further comprises a power source for the light.

The treadmill can have a controller provided on the underside of the slat base and in communication with the light, the controller controlling at least one of on/off, intensity and color.

The treadmill can have a light pipe extending along at least a portion of the leading edge of the slat base and a light source positioned on the slat base to illuminate the light pipe.

The treadmill can have a light source that is one or more of a micro LED, printed LED, and light paper.

The treadmill can have a light source that is positioned at an end of the light pipe.

The treadmill can have a light source that is positioned along a length of the light pipe between the leading edge and the light pipe.

The treadmill can have the upper surface of the slat base including a user contact surface having apertures formed in the user contact surface to create a pattern. The light can comprise a fiber optic associated with a respective aperture, the fiber optic having a light end positioned at the underside of the slat base and a lighted end of the fiber optic inserted into the respective aperture, the lighted end substantially flush with the user contact surface such that the lighted end is visible but does not protrude from the user contact surface.

The treadmill can include a controller provided on the underside of the slat base and in communication with each fiber optic, the controller configured to control each fiber optic individually for one or more of on/off, color and intensity.

The treadmill can have an upper surface of the slat base that includes a user contact surface with a cut-out in a pattern in the user contact surface. The light can comprise a light guide in a shape of the pattern and configured to fit within the cut-out and a light source positioned to illuminate the light guide.

The treadmill can have two adjacent lighted slats, wherein a first lighted slat of the two adjacent lighted slats has a first upper surface including a first user contact surface with a first cut-out in a first pattern in the first user contact surface. A first light of the first lighted slat can comprise a first light guide in a shape of the first pattern and configured to fit within the first cut-out and a first light source positioned to illuminate the first light guide. A second lighted slat of the two adjacent lighted slats has a second upper surface including a second user contact surface with a second cut-out in a second pattern in the second user contact surface. The second light of the second lighted slat can comprise a second light guide in a shape of the second pattern and configured to fit within the second cut-out and a second light source positioned to illuminate the second light guide, wherein the first light guide and the second light guide together form a cohesive pattern.

The treadmill can have a power source that is a battery carried on the underside of the slat base and in electrical communication with the light.

The treadmill can have a power source that includes a dual conducting power rail extending parallel to the at least one belt, the dual conducting power rail electrified by a primary power source, and two carbon brushes connected to the lighted slat and in contact with the dual conducting power rail as the lighted slat moves along the dual conducting power rail, the two carbon brushes electrified by the power rail and in electrical communication with the light.

The treadmill can have a power source that includes a first power rail and a second power rail extending parallel to the first power rail, the first and second power rails positioned proximate opposing ends of the lighted slat and powered by a primary power source, and a first carbon brush attached to the lighted slat and in contact with the first power rail and a second carbon brush attached to the lighted slat and in contact with the second power rail, wherein the first carbon brush and the second carbon brush conduct power to the light from the first and second power rails.

The treadmill can have a power source that includes a first power rail and a second power rail extending parallel to the first power rail, the first and second power rails positioned proximate opposing ends of the lighted slat and powered by a primary power source, and a first wire contact attached to the lighted slat and in contact with the first power rail and a second wire contact attached to the lighted slat and in contact with the second power rail, wherein the first wire contact and the second wire contact conduct power to the light from the first and second power rails.

BRIEF DESCRIPTION OF THE DRAWINGS

The disclosure is best understood from the following detailed description when read in conjunction with the accompanying drawings. It is emphasized that, according to common practice, the various features of the drawings are not to-scale. On the contrary, the dimensions of the various features are arbitrarily expanded or reduced for clarity.

FIG. **1** is a top perspective view of a treadmill.

FIG. **2** is a top perspective view of a weight measurement or presence detection system of the treadmill.

FIG. **3** is a diagram of internal components of the treadmill.

FIG. **4** is a side view of an embodiment of a lock.

FIG. **5**A is a flow diagram of an embodiment of a user-initiation system and process.

FIG. **5**B is a flow diagram of another embodiment of the user-initiation system and process.

FIG. **6** is a flow diagram of a process of engaging a lock when the lock has been disengaged and the treadmill has been in use.

FIG. **7** is a side view of an embodiment of a brake.

FIG. **8** is a flow diagram of a process of operating a brake while a tread of the treadmill is moving.

FIG. **9** is a top perspective view of lights configured to emit light through a first lens.

FIG. **10** is a top perspective view of the first lens and a third lens located in a cavity.

FIG. **11** is a side view of the tread and the cavity in which lights are located in the cavity and remain stationary relative to the tread.

FIG. **12** is a side view of a slat of the tread.

FIG. **13** is a top perspective view of a power rail.

FIG. **14** is a partial rear view of the slat including a contactor contacting the power rail according to one embodiment.

FIG. **15** is a rear view of a portion of the slat including two of the contactors contacting the power rail according to another embodiment.

FIG. **16**A is a is a top, partial cross-sectional view of a portion of the slat conductoring a power rail according to another embodiment.

FIG. **16**B is a side view of a portion of a power rail powering lighted slats around an axle.

FIG. **17** is a top perspective view of a portion of the slat according to another embodiment.

FIG. **18** is an exploded view of a portion of the slat according to another embodiment.

FIG. **19**A is an exploded view of another embodiment of a lighted slat.

FIG. **19**B is a cross-sectional view of the lighted slat of FIG. **19**A.

FIGS. **20**A-**20**C are examples of light pipes that can be used with the lighted slats described herein.

FIG. **21**A is a plan view of a lighted slat using light fiber optics.

FIG. **21**B is a side view of the lighted slat in FIG. **21**A.

FIGS. **22**A and **22**B are plan views of examples of lighted slats using light guides to create a pattern over one or more slats.

FIG. **22**C is a cross-sectional view of the lighted slat of FIG. **22**A.

FIGS. **23**A and **23**B are views of a power disk used to power the lighted slats as disclosed herein.

FIG. **24** is a schematic of the power disk attached to a belt wheel with a spring-loaded carbon brush together powering a lighted slat as disclosed herein.

FIG. **25** is a schematic of an example of a spring-loaded carbon brush.

DETAILED DESCRIPTION

Described herein are devices, systems, and methods to improve the operation of both motorized and non-motorized treadmills. A locking system is described that may be configured to stop rotation of a treadmill tread after a user of the treadmill dismounts the treadmill. The locking system may prevent operation of the treadmill until the system determines that the next user is an authorized user. A braking system is described that may be configured to slow rotation of the tread when the user steps off of the tread and onto side rails of the treadmill. The braking system may allow free rotation of the tread when the system determines that the user has stepped back onto the tread. Treadmill lighting systems are also described. The lighting systems may alert individuals near the treadmill that the treadmill is operational. The lighting systems may also convey information to the user and observers of the user, including but not limited to the user's performance or biometric data.

FIG. **1** is a top perspective view of a treadmill **100**. The treadmill **100** may include a tread **102**, side skirts **104**, side rails **106**, support members **108**, a handrail **110**, and a display **112**. The treadmill **100** may also include one or more sensors, including but not limited to: infrared sensors, weight sensors, heartrate sensors, proximity sensors, or any other user detection or biometric sensor. In the illustrated, non-limiting example shown in FIG. **1**, the treadmill **100** includes presence sensors **116**, weight sensors **118**, and proximity sensors **120**.

The tread **102** is a moving surface traversed by a user operating the treadmill **100** and may include a continuous or segmented belt. In the illustrated, non-limiting example shown in FIG. **1**, the tread **102** includes multiple slats.

Longitudinal ends of each slat may be attached to a respective belt that rotates on fixed bearings (e.g., free-turning roller bearings) around a front axle and a rear axle. The slats may be configured with a space between adjacent slats or the adjacent slats may be in contact with each other. In other embodiments, the tread **102** may include a continuous rubber belt. The tread **102** may be actuated by a motor (a motorized treadmill) or may be moved under the power of the user (a manual treadmill, also referred to a non-motorized treadmill). The tread **102** may be supported by an underlying frame (e.g., a rigid metal frame, not shown in FIG. **1**) such that the tread **102** may include a flat, curved, inclined, or declined shape or orientation. The tread **102** may include any other shape or orientation.

One or more side skirts **104** may be supported by the underlying frame on opposing sides of the tread **102**. Each side skirt **104** may include a side rail **106** located on an upper surface of the side skirt **104**. The side rails **106** may be integral with the side skirts **104** or may be separately located on the side skirts **104**. The side rail **106** provides a surface for the user to safely stand on the treadmill **100**. For example, the user may stand on the side rails **106** to mount or dismount the tread **102** or to mount or dismount the treadmill **100** entirely while the tread **102** is moving or stationary. The side rails **106** may extend along any length and width of the side skirts **104**. Each of the side rails **106** may include a foot pad **122** designating one or more portions of the side rails **106** on which the user may stand. The foot pads **122** may be integral with the side rails **106** or may be separately located on the side rails **106**. The foot pads **122** may be illuminated by lights located on, above, around, and/or underneath the foot pads **122** to indicate a location for the user to stand on the side rails **106**. For example, an outline of a foot may be illuminated from below the side rail **106** using opaque or transparent plastic material through which undermounted lights shine. The foot pads **122** may be illuminated by the lights in response to detection of the user by the proximity sensors **120**, the presence sensors **116**, or an input on the display **112**.

The support members **108** may include struts or any other structural member. The support members **108** may be coupled at one end to the underlying frame and/or the side skirts **104** and at the other end to the handrail **110**. The support members **108** provide structural support to the handrail **110** and may be coupled to any portion of the underlying frame and/or side skirts **104** (e.g., in the middle of the treadmill **100**, at either end of the treadmill **100**, or at any location therebetween). Any number of support members **108** can be used. The frame **202** may support other components of the treadmill **100** including but not limited to axles, the side skirts **104**, the side rails **106**, the support members **108**, and/or the handrail **110**. The frame **202** may be made of any metal or any other material and may include one or more structural members.

The handrail **110** is coupled to the support members **108** and provides the user support while the user is operating the treadmill **100**. For example, the user may hold onto the handrail **110** to mount or dismount the tread **102** or to mount or dismount the treadmill **100** entirely. The handrail **110**, alone or in combination with other support members, supports the display **112**. The display **112** may include any screen (e.g., touchscreen) located on the handrail **110**. The display **112** may include a non-contact skin temperature sensor **113** that may be configured to measure the temperature of the user while the user is present on the treadmill without the need for the sensor to contact the user. The display **112** may display information to the user including but not limited to: user heartrate, temperature, user calories burned, or any other biometric data; distance traveled, distance remaining, workout duration, workout time remaining, tread speed, user running pace, or any other user performance information; and/or data associated with another treadmill user.

The treadmill **100** may include one or more systems to improve functionality of the treadmill **100** and to enhance the user's experience. The treadmill **100** may include a lock system configured to prevent rotation of the tread **102** while the treadmill **100** is not in use and to stop rotation of the tread **102** in response to the user dismounting the treadmill **100**. The treadmill **100** may additionally include a braking system configured to slow rotation of the tread **102** while the treadmill **100** is being operated but no user is present on the tread **102**. These systems may operate in response to signals received from the weight sensors **118** and the presence sensors **116**.

One or more weight sensors **118** may be positioned such that weight and/or presence is detected when a user stands on the foot pads **122** and/or the side rails **106**. The weight sensors **118** may include strain sensors or any sensor configured to detect the weight and/or presence of the user. For example, two strain sensors may be positioned under each foot pad **122** between the underlying frame and a bracket **200** shown in FIG. **2**. The bracket **200** may be positioned under the foot pads **122** and the tread **102** to evenly distribute the user's weight to the weight sensors **118** while standing on the foot pads **122**.

In the illustrated, non-limiting example shown in FIG. **2**, the bracket **200** has two opposing flanges **204** that overlay the strain gauges. A plate **206** extends between the flanges **204** to connect the flanges **204**. In the illustrated, non-limiting example, the bracket **200** is U-shaped. The flanges **204** may be integral with the plate **206**. For example, the bracket **200** may include a one-piece, pre-formed plastic or metal bracket. The bracket **200** can also include any configuration and/or orientation relative to the frame **202**.

The weight sensors **118** may measure the weight of the user in response to the user stepping on the foot pads **122** overlying the bracket **200**. In some embodiments, in response to a request by the user to measure the user's weight (e.g., using the display **112**), the foot pads **122** may be illuminated by the lights to indicate to the user to stand on the foot pads **122**. The user's weight may also be automatically measured in response to the weight sensors **118** detecting the user's presence on the foot pads **122**. The user's weight may be displayed by the display **112**.

Additionally and/or alternatively, the weight sensors **118** may detect the user's presence on the foot pads **122** and/or side rails **106**. Additional weight sensors **118** may be positioned under the side rails **106** along a length of each side rail **106** for detecting presence. The treadmill **100** may be activated by a controller (later described with respect to FIG. **3**) in response to the weight sensors **118** detecting the presence of the user on the foot pads **122** and/or the side rails **106**. The treadmill **100** may also be deactivated by the controller in response to the weight sensors **118** detecting that no user is present on the foot pads **122** and/or the side rails **106**.

One or more of the presence sensors **116** may be located on any portion of the support members **108**, the handrail **110** or the display **112**. The presence sensors **116** may include infrared sensors, ultrasonic sensors, LED linear light sensors, or any other sensor configured to detect a presence of the user on the treadmill **100** (e.g., standing between the support members **108**, on the tread **102**, the side rails **106**, and/or the foot pads **122**). The presence sensors **116** are positioned such that presence of a person near but not on the treadmill **100** will not be detected. The presence sensors **116** and the weight sensors **118** may operate together to detect the presence of the user on any portion of the treadmill **100**.

In one example, a user initiation system and method include weight sensors **118** under the foot pads **122** and side rails **106**, presence sensors **116**, and a lock **316** (later described with respect to FIG. **3**). The user initiation method includes a user approaching a treadmill **100** with the intent to use the treadmill **100** that is not currently in use. If motorized, the power is off. In order to enable use of the treadmill **100**, the user steps on the foot pads **122** or side rails **106** to activate the weight sensors **118**, which detect the user's presence. Additionally, the presence sensors **116** detect that the user is on an area of the treadmill **100** in which desire to use may be inferred. The non-contact temperature sensor **113** can also function as a presence sensor **116**, as the detection of a temperature equivalent to that of a person will indicate that a user is present in an area of the treadmill in which use could be initiated. The combination of presence detected by both the weight sensors **118** and the presence sensors **116** can initiate unlocking of the lock **316**, which when in the locking position, prevents rotation of the tread **102** in any direction. Additionally, the user initiation system and method may require that the user input a code prior to unlocking the lock **316**, as will be described in more detail below. The user initiation system and method prevent the tread **102** from moving if a person or animal is on the treadmill **100** for reasons other than use.

FIG. **3** is a diagram of internal components of the treadmill **100** including the lock and brake systems. In the illustrated, non-limiting example, the frame **202** includes two side members supporting the side skirts **104** and multiple cross-members extending between the side members. The support members **108** are coupled to the side members of the frame **202**. The bracket **200** extends between the two side members of the frame **202**. Weight sensors **118** are positioned on side members of the frame **202** underneath the flanges **204** of the bracket **200**. Additional weight sensors **118** are positioned on the side members of the frame **202** underneath the side skirts **104**. The treadmill **100** may include any number of weight sensors.

The treadmill **100** may include a front axle **300** and a rear axle **302**. The front axle **300** and the rear axle **302** may be coupled to the frame **202** and may rotate relative to the frame **202** via bearings **312**. The bearings **312** may allow two-way or one-way rotation of the front axle **300** and the rear axle **302**. One-way rotation allows the tread **102** to rotate in only one direction and prohibits the tread **102** from moving "backwards" in the opposite direction.

The front axle **300** and the rear axle **302** may include a front axle drum **304** and a rear axle drum **306** respectively. The front axle drum **304** and the rear axle drum **306** may be fixed to the front axle **300** and the rear axle **302** respectively such that the front axle drum **304** and the rear axle drum **306** rotate with the front axle and the rear axle. The front axle drum **304** and the rear axle drum **306** may enlarge the diameter of the front axle **300** and the rear axle **302** respectively. The tread **102** may extend around the front axle drum **304** and the rear axle drum **306** such that rotation of the front axle drum **304** and/or the rear axle drum **306** results in rotation of the tread **102**. In embodiments where the treadmill **100** is motorized, an electric motor (not shown) can be coupled to and may rotate the front axle **300**, the rear axle **302**, the front axle drum **304**, and/or the rear axle drum **306** when activated. The electric motor may be coupled to the front axle **300**, rear axle **302**, front axle drum **304**, or rear axle drum **306** via a belt or any other known means. For example, a belt may be attached to the tread on either side of the tread, the belt rotated around wheels **338** that are turned by the axles/drums. The electric motor may be directly coupled to the frame **202** or may be coupled to the frame **202** via a bracket or any other intermediate component.

In embodiments where the treadmill **100** is non-motorized, the treadmill **100** may include an electric generator **308**. The electric generator **308** may convert rotation of the front axle **300**, the rear axle **302**, the front axle drum **304**, and/or the rear axle drum **306** to electrical energy stored in the battery **310**. The electric generator **308** may include a dynamo generator, a magneto motor, or any other device configured to convert rotation of the axles or axle drums to energy used to power the battery **310**. The electric generator **308** may be coupled to the front axle **300**, the rear axle **302**, the front axle drum **304**, or the rear axle drum **306** via a belt or any other known means. The electric generator **308** may be directly coupled to the frame **202** or may be coupled to the frame **202** via a bracket or any other intermediate component.

The battery **310** may include a 12/24 VDC battery but may include one or more batteries of any type, operating at any voltage. The battery **310** may be directly coupled to the frame **202** or may be coupled to the frame **202** via a bracket or any other intermediate component. In other embodiments, the battery **310** may not be coupled to the frame **202**. The battery **310** may be external to the treadmill **100** (e.g., the battery **310** may be located adjacent to the treadmill **100** or beneath the treadmill **100** in a space defined by the treadmill **100**). The battery **310** may include a charging port to receive power from an external power source. The charging port may be used if the charge of the battery **310** is depleted. The battery **310** may power any electrical component described herein, including but not limited to any lights, sensors, displays, or controllers. Additionally and/or alternatively, the treadmill **100** may include a power cord configured to electrically connect to an external power source (e.g., a power socket). Power received by the power cord may be used to power the described electrical components.

The treadmill **100** may include a controller **314**. The controller **314** may receive data from the presence sensors **116**, the weight sensors **118**, the proximity sensors **120**, and/or any other sensors. The controller **314** may also be in electrical communication with any other described electrical component, including but not limited to the display **112**, the electric generator **308**, and the battery **310**. The controller **314** may be coupled to any portion of the frame **202** but may be coupled to any portion of the treadmill **100**. The controller **314** may be coupled to the frame **202** via a bracket or any other intermediate component or may be directly coupled to the frame **202** or to a surface of the battery **310** (e.g., a top surface of the battery **310**).

The treadmill may also or alternatively include a wireless charging system including a battery having features similar to those of the battery, a power transmitter, and a power receiver, each in communication with the controller. The battery may be attached to any portion of the treadmill or may be placed near the treadmill. The power transmitter is configured to transmit power wirelessly from a power source (e.g., a wall outlet) to the power receiver via inductive coupling. In other embodiments, any suitable method of wireless power transfer may be used. The power receiver is configured to receive the power from the power transmitter and to supply the power to the battery for recharging.

The lock **316** is configured to automatically stop rotation of the tread **102** in any direction when the user is not present on the treadmill **100** (e.g., not present on the tread **102** or the side rails **106**). Once the lock **316** is engaged, such as when the user steps off of the treadmill, the lock **316** may prevent rotation of the tread **102** in any direction until the user is again identified by presence with the weight sensors, infrared sensors and, in some embodiments, the entry of an identification code.

The lock **316** may include a locking member **318**, a locking member receiver **320**, an actuator **322**, and an actuator bracket **324**. In the illustrated, non-limiting example shown in FIG. **3**, the locking member receiver **320** is coupled to the rear axle drum **306** and rotates with the rear axle drum **306**. The locking member receiver **320** may be coupled to the rear axle drum **306** using keys, screws, nuts, bolts, rivets, welding, or any other means of attachment. In other embodiments, the locking member receiver **320** may be coupled to the front axle **300**, the front axle drum **304**, or the rear axle **302**. The locking member receiver **320** is configured to receive the locking member **318**. The locking member receiver **320** may include a cam or any other device capable of engaging with the locking member **318** to prohibit rotation of the front axle **300**, rear axle **302**, front axle drum **304**, and/or the rear axle drum **306** in any direction.

The actuator **322** is configured to move the locking member **318** between a locked position and an unlocked position. The actuator **322** may include any type of spring, motor, solenoid, electric cylinder having an integrated motor, or any other device capable of moving the locking member **318** to engage the locking member receiver **320**. The actuator **322** is coupled to the actuator bracket **324** using any described means of attachment. The actuator bracket **324** is coupled to the frame **202** using any described means of attachment. In other embodiments, the actuator **322** may be directly coupled to any portion of the frame **202**.

The actuator **322** is configured to move the locking member **318** to engage the locking member receiver **320**. The locking member **318** can include any bolt, rod, plate, piston, or any other device configured to engage the locking member receiver **320** to prohibit rotation of the front axle **300**, rear axle **302**, front axle drum **304**, and/or the rear axle drum **306** in any direction.

To move the locking member **318** into the locked position, the actuator **322** moves the locking member **318** towards the locking member receiver **320** until the locking member **318** engages the locking member receiver **320**. In the locked position, contact between the locking member **318** and the locking member receiver **320** prohibits the locking member receiver **320** and the rear axle drum **306** from rotating in any direction. Stopping rotation of the rear axle drum **306** results in stopping rotation of the tread **102**. In the unlocked position, the locking member **318** does not contact the locking member receiver **320** and the locking member receiver **320** and the rear axle drum **306** is allowed to rotate freely. Multiple locks **316** may be used to stop rotation of the front axle **300**, the rear axle **302**, the front axle drum **304**, or the rear axle drum **306**. The lock **316** may be used in embodiments where the treadmill **100** is motorized or non-motorized.

FIG. **4** is a side view of an embodiment of a lock **400** that can be used as lock **316** and may include features similar to those of the lock **316** except as otherwise described. An actuator bracket **402** includes a first plate **404** and a second plate **406**. The first plate **404** can be disposed on one side of any portion of the frame **202** and the second plate **406** can be disposed on an opposing side of the portion of the frame **202**. The first plate **404** and the second plate **406** are coupled using nuts and screws, but any other described means of attachment can be used. The actuator bracket **402** is not limited to the structure shown in FIG. **4** but may include any intermediate component of any shape and size coupling an actuator to the frame **202**.

The lock **400** includes a toothed cam **408** coupled to the rear axle drum **306** such that the toothed cam **408** rotates with the rear axle drum **306**. The toothed cam **408** is coupled to the rear axle drum **306** using keys **409**. The toothed cam **408** may include two halves that are coupled via flanges **412** and fasteners such as nuts and bolts. The toothed cam **408** may include sidewalls on opposing sides of the toothed cam **408**. The toothed cam **408** is shown having four teeth but may include any number of teeth. The teeth of the toothed cam **408** may have any shape. In other embodiments, any type of cam having any shape may be used. The lock **400** includes a solenoid **414** (e.g., a bi-state solenoid) coupled to the first plate **404** of the actuator bracket **402** using screws, bolts, or any other described means of attachment. The solenoid **414** may include features similar to those of the actuator **322** except as otherwise described. In other embodiments, any other actuator may be used. The lock **400** includes a bolt **416** coupled to the solenoid **414**. The bolt **416** may include features similar to those of the locking member **318** except as otherwise described.

The solenoid **414** is configured to move the bolt **416** between locked and unlocked positions. To move the bolt **416** into the locked position (shown in broken lines), the solenoid **414** moves the bolt **416** towards the toothed cam **408** until the bolt **416** engages a tooth of the toothed cam **408**. Engagement between the bolt **416** and the tooth of the toothed cam **408** stops the toothed cam **408** from rotating in any direction. Stopping rotation of the toothed cam **408** stops rotation of the rear axle drum **306**, which stops rotation of the tread **102**. To move the bolt **416** into the unlocked position, the solenoid **414** is configured to move the bolt away from the toothed cam **408** until the bolt **416** does not contact the toothed cam **408**, allowing the toothed cam **408** to rotate freely. In embodiments where the solenoid **414** is a bi-state solenoid, once the solenoid **414** is energized by the battery **310** to move the bolt **416** to the locked position, the bolt **416** remains in the locked position until the solenoid **414** is energized again. In such embodiments, the bolt **416** may remain in the locked position even if no power is supplied to the solenoid **414** or any other component of the treadmill **100**. Similarly, once the solenoid **414** is energized by the battery **310** to move the bolt **416** to the unlocked position, the bolt **416** remains in the unlocked position until the solenoid **414** is energized again.

The lock **316** (or lock **400**) may be in electrical communication with the controller **314** and may operate in conjunction with the weight sensors **118** and the presence sensors **116** as a user-initiated system and method as follows. When not in use, the treadmill **100** will be locked, i.e., the lock **316** will be in the locked position. For example, if, during operation of the treadmill **100**, the controller **314** determines that the user is not present on the tread **102** and not present on the side rails **106**, the controller **314** is configured to engage the lock **316** as previously described to prevent movement of the tread **102** in any direction. Engagement of the lock **316** may be instant, i.e., as soon as the sensors **118**, **116** both fail to detect a user. Engagement of the lock **316** may occur after a period of time. In embodiments where the treadmill **100** is motorized, the controller **314** may disconnect (e.g., electrically disconnect) power to the electric motor (not shown) before engaging the lock **316**. In embodiments where the treadmill **100** is non-motorized, the battery powers the actuator to engage the lock **316**. Prior to or in response to engaging the lock **316**, the display **112** may generate a notification indicating to the user that the lock **316** will be engaged and/or is engaged.

Once the controller **314** has engaged the lock **316**, the lock **316** remains engaged until the controller **314** determines that one or more initiation criteria have been met. The initiation criteria may include one or more in combination: detection of the user's presence on the foot pads **122** by the weight sensors **118**; detection of the user's presence on both side rails **106** by the weight sensors **118**; detection of the user's presence on any portion of the side rail **106** by the weight sensors **118**; detection of the user by the presence sensors **116**; a determination by the controller **314** that a user weight detected by the weight sensors **118** meets or exceeds a threshold weight; and/or authorization of an identification code entered by the user (e.g., using the display **112**).

In embodiments where the initiation criteria includes authorization of the identification code, the controller **314** may verify the identification code by comparing the identification code to a list of authorized codes stored locally on the treadmill **100** (e.g., in memory included in the controller **314**) or remotely on a server device in communication with the treadmill **100** (e.g., in communication with the controller **314**) in response to receiving the user's identification code. The controller **314** may disengage the lock **316** in response to determining that the identification code entered by the user matches one of the authorized codes. The identification code prevents unauthorized users from using the treadmill **100**. In some embodiments, no identification code is required. Additionally and/or alternatively, the treadmill **100** may verify the identity of the user using biometric information detected by any sensors located on the treadmill **100** (e.g., fingerprint data, voice data, or facial recognition data).

FIG. **5**A is a flow diagram of an embodiment of the user-initiation system and process **500**, initiating use of the treadmill **100** where the lock **316** is in the engaged position. It is contemplated that either or both of a weight sensor or presence sensor may detect a user on the treadmill and turn on the display. The display may direct the user to stand on the foot pads **122** to unlock the tread. In operation **502**, the controller **314** receives a signal from the weight sensors **118** indicating detection of the user's presence the foot pads **122**. In operation **504**, the controller **314** determines whether the weight of the user meets or exceeds a threshold weight in response to the weight sensors **118** detecting the user's presence. The threshold weight can be preprogrammed into the controller or can be set by the owner or operator. As one example, the weight threshold reduces the chance that a child who should not be using the treadmill is able to unlock the treadmill. In optional operation **506**, the controller **314** receives an identification code and determines whether the identification code is an authorized code. It is contemplated that the display may present a prompt for the user to input his or her identification code prior to or once the user is standing on the foot pads **122**.

In operation **508**, the controller **314** initiates disengagement of the lock **316** in response to determining that the user is present on the foot pads **122** and equals or exceeds the threshold weight and optionally inputted the proper identification code, leaving the user free to use the treadmill **100**. The disengagement is powered by the battery for a non-motorized treadmill and is powered by the motor for a motorized treadmill. For example, referring to the lock **400** shown in FIG. **4**, the controller **314** may initiate the solenoid **414** to move the bolt **416** away from the toothed cam **408** into the locked position. In operation **508**, the controller **314** may also initiate activation of any other electronic components of the treadmill **100**, including but not limited to any displays, lights, motors, or controllers. The initiation system will not be needed again until the lock is in its locked position.

FIG. **5**B is a flow diagram of another embodiment of the user-initiation system and process **520**, initiating use of the treadmill **100** where the lock **316** is in the engaged position. It is contemplated that either or both of a weight sensor or presence sensor may detect a user on the treadmill and turn on the display. The display may direct the user to stand on the side rails for safety. In operation **522**, the controller **314** receives a signal from at least one weight sensor **118** on at least one side rail indicating detection of the user's presence. Alternatively, the system may require that the controller **314** receives a signal from at least one weight sensor **118** on each side rail indicating presence of the user, i.e., the user is straddling the tread. In operation **524**, the controller **314** receives a signal from the presence sensors **116** indicating detection of the user in an area of the tread and/or side rails suggesting an intent to use the treadmill. In operation **526**, the controller **314** receives an identification code and determines whether the identification code is an authorized code. It is contemplated that the display may present a prompt for the user to input his or her identification code prior to or once the user is standing on the foot pads **122**.

In operation **528**, the controller **314** initiates disengagement of the lock **316** in response to determining that the user is present on the treadmill and has input the proper identification code, leaving the user free to use the treadmill **100**.

FIG. **6** is a flow diagram of a process **600** of engaging the lock **316** when the lock has been disengaged and the treadmill has been in use. In operation **602**, the controller **314** receives no signal from any of the weight sensors **118** associated with the foot pads **122** and the side rails **106**. In operation **604**, the controller **314** receives no signal from any presence sensor **116**. In operation **606**, the controller **314** determines that no user is present on the treadmill **100** in response to the lack of a signal from any weight sensor **118** and any presence sensor **116**.

In embodiments where the treadmill **100** is a motorized treadmill, the process **600** may include operation **608**. In operation **608**, the controller **314** disconnects the electric motor from power in response to determining that no user is present on the treadmill **100**. The controller **314** may initiate engagement of the lock **316** in response to determining that no user is present on the treadmill **100** and in response to disconnecting the power to the electric motor. In embodiments where the treadmill **100** is a non-motorized treadmill, the process **600** proceeds from operation **606** to operation **610**. In operation **610**, the controller **314** initiates engagement of the lock **316** in response to determining that no user is present on the treadmill **100**. The controller **314** may initiate engagement of the lock **316** after a threshold period has expired. In one example, the controller **314** may initiate engagement of the lock **316** in response to determining that no user is present on the treadmill **100** and to determining that the threshold period has expired. The threshold period begins in response to determining that no user is present on the treadmill **100**. The threshold period of time can vary and can be set by the user of the treadmill or can be predetermined. The lock **316** remains engaged until the initiation process previously described is completed. The controller **314** may deactivate the display **112** and/or other electronic components of the treadmill **100** in response to determining that no user is present on the tread **102** and that no user is present on the side rails **106**.

Referring back to FIG. **3**, the treadmill **100** may include a brake **326**. The brake **326** is configured to slow rotation of the tread **102** in response to the user stepping off of the tread **102** and onto the side rails **106** (e.g., while the user is resting). By slowing but not completely stopping rotation of the tread **102** while the user is resting on the side rails **106**, the user may step back onto the tread **102** and continue using the treadmill more easily. Additionally and/or alternatively, the brake **326** may stop rotation of the tread **102** over a period of time if the user is standing on the side rails **106** for an extended period of time.

During use of the treadmill **100**, a user may step on the side rails **106** and off of the tread **102** to take a drink, answer a phone call, talk to someone present, or rest, as non-limiting examples. When the user steps on the side rails **106** while the tread **102** is moving, the brake **326** engages to slow the tread **102** down so that when the user is ready to step back on the tread **102**, the tread **102** moves at a slower, more manageable pace than when the user stepped off. If the treadmill **100** is a motorized treadmill, the power to the electric motor will be temporarily disconnected while the brake **326** is applied. The brake **326** may be applied until the user steps back on the tread **102**, i.e., no weight sensor **118** on the side rails **106** detects the user's weight. The user will then bring the tread **102** up to the desired rotational speed, either under the user's own power (if the treadmill **100** is non-motorized) or by using a tread speed control on the display **112** (if the treadmill **100** is motorized). If the user remains off the tread **102** and on the foot pads **122** for a period of time, the brake **326** may be disengaged when a threshold time or speed is reached, allowing the tread **102** to further slow under its own momentum. Alternatively, the brake **326** can be applied until the earlier of the tread **102** is stopped or the user steps back on the tread **102**.

The brake **326** may include a brake actuator **328**, a brake actuator bracket **330**, a braking member **332**, and a braking member receiver **334**. In the illustrated, non-limiting example, the braking member receiver **334** is coupled to and rotates with the front axle drum **304**. The braking member receiver **334** includes a channel **336** having an interior profile corresponding to the exterior profile of the braking member **332**. The braking member receiver **334** may be coupled to the front axle drum **304** using keys, screws, nuts, bolts, rivets, welding, or any other means of attachment. In other embodiments, the braking member receiver **334** may be coupled to the front axle **300**, the rear axle **302**, or the rear axle drum **306**. The braking member receiver **334** is configured to receive the braking member **332**. The braking member receiver **334** may include a circular coupling or any other device configured to receive the braking member **332** to slow rotation of the front axle **300**, rear axle **302**, front axle drum **304**, and/or the rear axle drum **306**. Multiple brakes **326** may be used to slow rotation of the front axle **300**, the rear axle **302**, or the rear axle drum **306**. The brake **326** may be used in embodiments where the treadmill **100** is motorized or non-motorized.

The brake actuator **328** is configured to move the braking member **332** between a braking position and a non-braking position. The brake actuator **328** may include any type of spring, motor, solenoid, electric cylinder having an integrated motor, or any other device capable of moving the braking member **332** to engage the braking member receiver **334**. The brake actuator **328** is coupled to the brake actuator bracket **330** using any described means of attachment. The brake actuator bracket is coupled to the frame **202** using any described means of attachment. In other embodiments, the brake actuator **328** may be directly coupled to any portion of the frame **202**.

The brake actuator **328** is configured to move the braking member **332** to engage the braking member receiver **334**. The braking member **332** can include a brake pad, caliper, or any other device configured to engage the braking member receiver **334** to slow rotation of the front axle **300**, rear axle **302**, front axle drum **304**, and/or the rear axle drum **306**.

To move the braking member **332** into the braking position, the brake actuator **328** moves the braking member **332** towards the braking member receiver **334** until the braking member **332** engages the braking member receiver **334**. In the braking position, friction between the braking member **332** and the braking member receiver **334** reduces the rotational speed of the front axle drum **304**. In the non-braking position, the braking member **332** does not engage the braking member receiver **334** and the front axle drum **304** is allowed to rotate freely. A reduction in rotational speed of the front axle drum **304** results in a reduction in rotational speed of the tread **102**. In some embodiments, the braking member receiver **334** is not required and the braking member **332** directly engages the front axle **300**, the rear axle **302**, the front axle drum **304**, and/or the rear axle drum **306**.

FIG. **7** is a side view of an embodiment of a brake **700** that can be used as brake **326** and may include features similar to those of brake **326** except as otherwise described. In the illustrated, non-limiting example, the brake **700** includes a brake actuator bracket **702** including a first plate **704** and a second plate **706**. The first plate **704** can be disposed on one side of any portion of the frame **202** and the second plate **706** can be disposed on an opposing side of the portion of the frame **202**. The first plate **704** and the second plate **706** are coupled using nuts and screws, but any other described means of attachment can be used. The brake actuator bracket **702** is not limited to the structure shown in FIG. **7** but may include any intermediate component of any shape and size coupling a brake actuator to the frame **202**.

The brake **700** includes a solenoid **708** (e.g., a bi-state solenoid) coupled to the first plate **704** of the brake actuator bracket **702** using screws, bolts, or any other described means of attachment. The solenoid **708** is an example of the brake actuator **328** except as otherwise described. The brake **700** includes braking member **710** having a bolt **712**, a brake pad retainer **714**, and a brake pad **716**. The braking member **710** may include features similar to those of the braking member **332** except as otherwise described. The bolt **712** is coupled to a brake pad retainer **714**. The brake pad retainer **714** may be integral with the bolt **712** or coupled separately to the bolt **712**. The brake pad retainer **714** includes a curved shape. A brake pad **716** having a curved shape is coupled to the brake pad retainer **714**. The brake pad **716** may be made of ceramic or any other suitable material. In other embodiments, the brake **700** may not include the braking member **710** but may include any device configured to engage a braking member receiver.

The brake **700** includes a circular coupling **718** extending around the front axle drum **304**. The circular coupling **718** may include features similar to those of the braking member receiver **334** unless otherwise described. The circular coupling **718** may include two halves that are coupled via flanges **720** and fasteners such as nuts and bolts. The circular coupling **718** is coupled to the front axle drum **304** using keys **722**. The circular coupling **718** defines a channel **724** having an interior profile shaped to correspond to an exterior profile of the brake pad **716**. In other embodiments, the brake **700** may not include the circular coupling **718** but may include any device configured to receive a braking member (e.g., the bolt **712**) to slow an axle or axle drum of the treadmill **100**.

The solenoid **708** is powered by the battery **310** for a non-motorized treadmill and moves the braking member **710** between the braking and non-braking positions. In the braking position, the brake pad **716** contacts an interior surface of the channel **724** and friction between the brake pad **716** and the circular coupling **718** slows rotation of the front axle drum **304**. In the non-braking position of the braking member **710**, the brake pad **716** does not contact the circular coupling **718** and the front axle drum **304** is allowed to rotate freely. In embodiments where the solenoid **708** is a bi-state solenoid, once the solenoid **708** is energized by the battery **310** to move the braking member **710** to the braking position, the braking member **710** remains in the braking position until the solenoid **708** is energized again. Similarly, once the solenoid **708** is energized by the battery **310** to move the braking member **710** to the non-braking position, the braking member **710** remains in the braking position until the solenoid **708** is energized again.

The brake actuator **328** may be in electrical communication with the controller **314** and may operate in conjunction with the weight sensors **118** and the presence sensors **116** as follows. The presence sensors **116** located on the support members **108** and/or the handrail **110** are configured to detect the presence of the user on the treadmill **100** (e.g., the user is standing on any portion of the tread **102** or side rails **106**). The weight sensors **118** located underneath the side rails **106** are configured to detect whether the user is present on any portion of the side rails **106** and/or foot pads **122**. In response to the controller **314** determining that the user is present on the tread **102** and that the user is not present on either of the side rails **106**, the brake **326** remains disengaged, allowing the tread **102** to rotate freely.

If, during operation of the treadmill **100**, the controller **314** determines that the user is present on both the side rails **106** (e.g., simultaneously) and that the user is not present on the tread **102** (e.g., the user has stepped off the tread **102** onto one or both of the side rails **106**) the controller **314** may engage the brake **326** to slow rotation of the tread **102** as previously described. Optionally, the controller **314** may be configured to apply the brake **326** only when the user is standing on both foot pads **122**, indicating a desire for the brake to be applied. The display may indicate to the user during use that stepping on the foot pads **122** will apply the break during a rest period. In response to engaging the brake **326**, the display **112** may generate a notification indicating to the user that the brake **326** is engaged. The brake **326** may slow rotation of the tread **102** to threshold speed which may be predetermined or may be set by the user. In response to the controller **314** determining that the tread **102** is rotating at the threshold speed, the controller **314** may fully or partially disengage the brake. After the brake **326** has been engaged, and in response to the controller **314** determining that the user is present on the tread **102** and not present on the side rails **106** (e.g., the user has stepped off of the side rails **106** back onto the tread **102**), the controller may disengage the brake **326**, allowing the tread **102** to rotate freely. In embodiments where the treadmill **100** is motorized, the controller **314** may disconnect (e.g., electrically disconnect) power to the electric motor before engaging the brake **326** and reconnect power when the brake **326** is disengaged.

FIG. **8** is a flow diagram of a process **800** of operating the brake **326** while the tread **102** is moving. At operation **802**, the controller **314** receives a signal from the weight sensors **118** indicating the user's presence on both of the side rails **106**, e.g., the user is straddling the tread **102**. At operation **804**, the controller **314** receives a signal from the presence sensors **116** indicating the user's presence in the area of the treadmill **100** indicating use. At operation **806**, the controller **314** determines that the user is "resting" and that the brake **326** should be initiated. In embodiments where the treadmill **100** is a motorized treadmill, the process **800** may include operation **808**. In operation **808**, the controller **314** disconnects the electric motor from power in response to determining that the user is present on both of the side rails **106**. In embodiments where the treadmill **100** is a non-motorized treadmill, the process **800** proceeds from operation **806** to operation **810**.

At operation **810**, the controller **314** initiates engagement of the brake **326**. For example, referring to the brake **700** shown in FIG. **7**, the controller **314** can initiate the braking member **710** to move such that the brake pad **716** contacts the circular coupling **718**. In some embodiments, the controller **314** may initiate engagement of the brake **326** in response to determining the user is present on any portion of each side rail. In other embodiments, the controller **314** may initiate engagement of the brake **326** in response to the user being present on the foot pads **122**. Additionally and/or alternatively, the controller **314** may initiate engagement of the brake **326** in response to the tread **102** reaching a maximum speed. The maximum speed may be set by the user or may be predetermined.

At operation **812**, the controller **314** receives a signal from the weight sensors **118** indicating that the user is not present on either of the side rails **106** (e.g., the controller detects that no signal is received from any weight sensor **118** on either side rail **106**). At operation **814**, the controller receives a signal (i.e., continues to receive the signal of presence of the user) from the presence sensors indicating the user's presence on the area of the treadmill **100** indicating use. At operation **816**, the controller determines the user is back on the tread **102** to use the treadmill **100**. At operation **818**, the controller **314** initiates disengagement of the brake **326** in response to determining that the user is present on the tread **102**. For example, referring to the brake **700** shown in FIG. **7**, the controller **314** can initiate the braking member **710** to move such that the brake pad **716** does not contact the circular coupling **718**.

The treadmill **100** may include lights and lighting systems configured to provide information to the user and/or to others (e.g., warn others in the vicinity that the treadmill **100** is operational).

Referring back to FIG. **1**, one or more of the proximity sensors **120** may be located on one or more of the side skirts **104**. For example, one or more proximity sensors **120** can be located on a side surface of the side skirts **104** such that the proximity sensors **120** are spaced around a periphery of the treadmill **100**. Additionally and/or alternatively, the proximity sensors can be located on any other portion of the treadmill **100**, including but not limited to the support members **108**, the handrail **110**, or the display **112**. The proximity sensors **120** may include one or more infrared sensors, ultrasonic sensors, LED linear light sensors, thermal sensors or any other sensor configured to detect a presence of a person, animal, or object approaching the treadmill **100**. For example, the proximity sensors **120** may be configured to detect the presence of any person within a predetermined radius of the proximity sensor **120** (e.g., 20-48 inches). The controller **314** may receive signals from the proximity sensors **120** indicating detection of the user or another person approaching the treadmill **100**.

When the controller **314** receives signals from at least one of the proximity sensors **120** and the treadmill is not in use, the controller may initiate the display upon receipt of the signal, and the display may provide the user-initiation steps for using the treadmill, as a non-limiting example. When the controller **314** receives signals from at least one of the proximity sensors **120** and the treadmill **100** is in use, the display may warn the user that the treadmill is being approached.

The treadmill **100** may include peripheral lights **124** configured to illuminate an area on the floor surrounding the treadmill **100** to, for example, alert an approaching person that he or she is approaching a treadmill **100** that is in use, i.e., the tread **102** is moving. The peripheral lights **124** may be located on and/or under the side skirts **104**, side rails **106** or handrails peripheral **110**, and may include LED lights, lasers, projectors, or any other light source. The peripheral lights **124** may be of any color and may illuminate according to any predetermined or user-customized setting (e.g., flashing). The peripheral lights **124** may also change color according to any predetermined or user-customized setting. The lights **124** may project any symbols, words, patterns, or images onto the surrounding area in any configuration or orientation. As a non-limiting example, the peripheral lights **124** can form a light wall **126** on the floor around the treadmill **100** to warn approaching persons that the treadmill **100** is in use. The light wall may be spaced from the treadmill **100**, such as **12-24** inches from the treadmill **100** and may surround the treadmill **100** partially or completely. The peripheral lights **124** can be yellow or red, for example, which are typically used to indicate a warning such as yield or stop.

The peripheral lights **124** may operate in conjunction with the controller **314** and other components of the treadmill **100** as follows. In response to the controller **314** determining that a subject is present within a predetermined radius of a treadmill **100** that is in use (e.g., in response to the proximity sensors **120** detecting the presence of an approaching person), the controller **314** may activate the peripheral lights **124** to illuminate the area surrounding the treadmill. In response to the proximity sensors **120** detecting the presence of a person approaching the treadmill **100** (e.g., from the side or from behind the treadmill **100**), the display **112** may generate a notification for the user indicating to the user the approaching person's presence and location relative to the treadmill **100**.

The controller **314** may activate the peripheral lights **124** to illuminate the area surrounding the treadmill and/or may change the color of the peripheral lights **124** in response to engagement of the brake **326** or in response to engagement of the lock **316**. For example, the peripheral lights **124** may not be activated when the lock **316** is engaged.

One or more projectors **114** may be located on any portion of the treadmill **100**, including but not limited to any portion of the handrail **110** (e.g., inside the handrail **110**), the support members **108**, and/or the side skirts **104**. The projectors **114** may be configured to project an image onto a projection area **115**. The projection area **115** may include any area nearby the treadmill (e.g., floors, walls, or ceiling). The image may include any previously described biometric and/or performance data associated with the user or another treadmill user. For example, the projectors **114** can project biometric or user performance data on the floor near the treadmill **100** to be viewed by judges during a competition. Additionally and/or alternatively, the projectors **114** can project advertising or marketing information such as a company logo. The projectors **114** may project the data onto any surface or surfaces near the treadmill **100** in response to a command issued by the user. The controller **314** may activate the projectors **114** in response to determining the user is present near the treadmill **100**.

The treadmill **100** may include a lighting system configured to emit light through or on the tread. The lighting system may alert the user and other individuals that the treadmill **100** is operational, may warn individuals nearby the treadmill **100** not to approach to the treadmill **100**, may communicate biometric or performance information to the user or observers, such as judges in a competition, may be used for aesthetics and may be used for advertisement.

As shown in FIG. **1**, the tread **102** may be formed of multiple slats. The slats are configured to form a surface on which the user may exercise and are positioned next to adjacent slats to mimic a continuous belt, and may have a small space between adjacent slats or adjacent slats may contact each other. The lighting system includes lights positioned below the slats on which the user stands. The lights are located in a cavity defined on the top and bottom by the tread **102** that rotates on the front and rear axles **300**, **302**. The tread surface is the surface facing away from the cavity and includes the surface on which the user exercises. The lock **316**, the brake **326**, the front axle **300**, rear axle **302**, the front axle drum **304**, and the rear axle drum **306** may be located in the cavity. The lights may be configured to emit light away from the cavity and through the one or more adjacent slats along any length of the tread **102**.

The lights as disclosed herein have light sources that may include LEDs, neon lights, light rope or lights of any other type. A light rope includes lights, such as LEDs, encased in a material such as PVC to create a string of lights. Light sources may also include printed LEDs, micro LEDs, lightpaper and other sources know to those skilled in the art. A combination of light sources may be used such as micro LEDs and lightpaper. The lights may also include one or more integrated circuits. When used herein, LED is considered to include an LED or an LED circuit board. Light pipes, light tubes and light guides are physical structures used for transmitting or distributing light from the light source, the structures often curved but can be linear. A light pipe transports light from a light source to an emitting area, and can transport the light to a different surface or separate area from the location of the light source. Light pipes can be flexible. A lens can be a light pipe or a light guide. A light guide distributes light from the light source to a particular area that requires illumination, usually a larger area than with a light pipe. The light pipe, light guide, light rope, etc. structures may have a rectangular shape, a cylindrical shape, a tubular shape, or any other shape and may can be of varying dimensions. A light diffuser reduces the intensity of light from a light source and spreads it over a wider area. A light diffuser is made from an optically opaque material, while light guides and pipes are typically optically clear. The lights may be a particular color, or may be able to change color based on timing or a control mechanism. The term "light guide" and "light pipe" are not meant to be limiting and may be used interchangeably with each other and other terms, such a light tube or lens. The terms are means to describe a structure between a light source and an illumination area. The term "light" as used herein refers to a light source and may also include one or more of a light guide, light pipe, lens, and diffuser. The term "lighted slat" refers to a slat with a light.

The lighting system may also include the controller **314** or any other controller configured to control the lights. The lights may be in communication (e.g., wired or wireless communication) with the controller **314** or any other controller. The lights may operate in conjunction with the controller **314** and other components of the treadmill **100**. The controller **314** may control the activation, deactivation, color, brightness, and/or light emission frequency of the lights. The controller **314** may configured to control at least one of the color, brightness, or light emission frequency of the lights in response to receiving a signal from a biometric sensor shown in FIG. **1**. The biometric sensor may include the non-contact skin temperature sensor **113**, a heartrate sensor, one or more of the weight sensors **118**, or any other sensor configured to detect biometric information associated with the user. The biometric sensor may be located on any portion of the treadmill **100**. The controller **314** may also be configured to control at least one of the color, brightness, or light emission frequency of the lights in response to calculating biometric information of the user based on signals received from the biometric sensor, including but not limited to calories burned or body mass index. The biometric sensor may detect biometric information data associated with the user in response to a request from the user. Additionally and/or alternatively, the biometric sensor may detect biometric information associated with the user in response to the weight sensors **118** detecting the user's presence on the foot pads **122** and/or side rails **106**.

The controller **314** may control at least one of the color, brightness, or light emission frequency of the lights based on performance data associated by the user, including but not limited to distance traveled, distance remaining, workout duration, workout time remaining, tread speed, user running pace, or any other user performance information; and/or data associated with another treadmill user.

The controller **314** may also activate the lights in response to receiving a signal from the proximity sensors **120** indicating the presence of a user or another individual near the treadmill **100**. For example, when the treadmill is not in use, the proximity sensors **120** may detect that a person is approaching the treadmill **100** and send a signal to the controller **314** to activate the lights. The lights may be activated to invite the approaching person to use the treadmill **100**, such as using certain colors or flashing lights. As another example, when the treadmill **100** is in use, the proximity sensors **120** may detect that a person is approaching the treadmill **100** and send a signal to the controller **314** to flash the already activated lights or to change the color of the lights to a color such as yellow or red to warn the approaching person that the tread **102** is moving.

The lights may include one or more sets of lights configured to illuminate different portions of the treadmill **100**. For example, the lighting system may include a first set of lights configured to be controlled by the controller **314** to illuminate a front portion **128** (shown in FIG. **1**) of the treadmill. The front portion of the treadmill **100** is associated with the location where slats approach the front axle **300** and turn around the front axle **300**. The lighting system may include a second set of lights configured to be controlled by the controller **314** to illuminate a rear portion **130** (shown in FIG. **1**) of the treadmill, where the rear portion **130** is opposite the front portion **128**. The rear portion **130** is associated with the location where slats approach the rear axle **302** and turn around the rear axle **302**. The lighting system may also include a third set of lights configured to illuminate a middle portion **130** (shown in FIG. **1**) of the treadmill, where the middle portion **132** extends between the front portion **128** and the rear portion **130**. The front portion, the rear portion, and the middle portion of the treadmill can be separately illuminated by the lights in any color, brightness, or light emission frequency in any combination. For example, the controller **314** may be configured to illuminate the front and rear portions of the treadmill **100** using a first color (e.g., yellow) and to illuminate the middle portion using a second color (e.g., green). By illuminating the front and rear portions of the treadmill **100** using a color typically associated with a warning, such as yellow, orange, or red, the lighting system may alert individuals nearby the treadmill **100** to use caution while near the treadmill **100**.

The lighting system may include lights located in the cavity that remain stationary with respect to the tread **102**. FIG. **9** is a top perspective view of lights **900** configured to emit light through a first lens **902**. The lights **900** may include features similar to those of the lights previously described. The first lens **902** may include a transparent or semi-transparent member configured to receive light from the lights **900** and to emit light through the tread **102** (not shown in FIG. **9**). The first lens **902** may be made of any plastic such as acrylic, glass, or any other material configured to refract light emitted by the lights **900**. The first lens **902** may have a curved shape and may extend around a portion of a circumference of the front axle **300**, the rear axle **302**, the front axle drum **304**, or the rear axle drum **306**. For example, the first lens **902** shown in FIG. **9** includes a plastic sheet having curved shape such that the first lens **902** may be attached to the treadmill **100** around a portion of a circumference of the front axle drum **304**. The first lens **902** may be located upstream of the front axle **300** or the front axle drum **304** in relation to movement of the tread **102**. In this position, the first lens **902** may illuminate the front portion of the treadmill when the lights **900** are activated. The first lens **902** may include ribs **904** extending along a length of the first lens **902** to structurally reinforce the first lens **902**.

A second lens (not shown) having features similar to those of the first lens **902** may include a curved shape and may extend around a portion of a circumference of the rear axle **302** or the rear axle drum **306** such that the rear portion of the treadmill **100** may be illuminated. The second lens may be located in the cavity downstream of the rear axle **302** or the rear axle drum **306** in relation to the movement of the tread **102**. A second set of lights (not shown) having features similar to those of the lights **900** may be attached to the second lens.

The lights **900** may be positioned and/or configured in the cavity such that the lights **900** emit light through the first lens **902** to illuminate a portion of the tread **102**. For example, the lights may be positioned on an edge of the first lens **902** such that light emitted by the lights **900** is refracted by the first lens **902** and emitted through the adjacent slats of the tread **102**. In the illustrated, non-limiting example, the lights **900** are located on a housing **906**. The housing **906** is attached to an edge of the first lens **902** such that the lights **900** emit light through the first lens **902**. In other embodiments, the housing **906** may be attached to any portion of the first lens **902**. The housing **906** may include a bracket configured to attach to the first lens **902**, a transparent flexible tube in which the lights **900** are located, an elongate strip, or any other device configured to attach the lights **900** to the first lens **902**. In other embodiments, the lights **900** may be directly attached to the first lens **902**. In other embodiments, the lights **900** may not be connected to the first lens **902** and may be located near the first lens **902** such that the lights **900** emit light through the first lens **902**. The first lens **902** may include apertures **908** to attach the first lens **902** to the frame **202**, a lens bracket, or any intermediate component, or any other component of the treadmill **100**.

FIG. **10** is a top perspective view of the first lens **902** and a third lens **1002** located in a cavity **1000**. The cavity **1000** may include features similar to those of the cavity previously described. In the illustrated, non-limiting example, the first lens **902** is attached to a lens bracket **1004** such that the first lens **902** extends around the front axle drum **304**. The housing **906** is attached to a bottom edge of the first lens **902**. The lens bracket **1004** is attached to a member of the frame **202**. The lens bracket **1004** may be attached to the first lens **902** and the frame **202** using any means of attachment. In the position shown in FIG. **10**, the first lens **902** may illuminate the front portion of the treadmill when the lights **900** emit light through the first lens **902**. A second lens (not shown) having features similar to those of the firsts lens **902** may be similarly attached to the rear portion of the treadmill **100** such that the second lens may extend around the rear axle drum **306** and illuminate the rear portion of the treadmill **100**.

The third lens **1002** may include features similar to those of the first lens **902** except as otherwise described. The third lens **1002** may extend along a length of the middle portion of the treadmill **100**. In other embodiments, the third lens **1002** may extend along any length of the treadmill **100**. The third lens **1002** may include flanges **1005** and an arcuate portion **1006** extending between the flanges **1005**. The flanges **1005** may be integral with the arcuate portion **1006** or may be separately connected to the arcuate portion **1006**. In other embodiments, the third lens may include any other shape or orientation. The flanges **1005** may be attached to top surfaces of bearing supports **1008**. The bearing supports **1008** may support bearings used to rotate belts attached to the slats (not shown) forming the tread **102**. In other embodiments, the third lens **1002** may be attached to any portion of the frame **202** or any other component of the treadmill **100**. Lights **1010** having features similar to those of lights **900** may be configured to emit light into the third lens **1002** to illuminate the middle portion of the treadmill **100**. For example, the lights **1010** may be positioned on an edge of the third lens **1002** such that light emitted between adjacent slats of the tread **102**. In the illustrated, non-limiting example, the lights **1010** are located on a housing **1012** having features similar to those of the housing **906**. The housing **1012** is attached to an edge of the third lens **1002** such that the lights **1010** emit light through the third lens **1002**. In other embodiments, the housing **1012** may be attached to any portion of the third lens **1002**.

In other embodiments, the treadmill **100** may include one lens configured to extend along the length of the treadmill **100** and to extend around the front axle **300** and the rear axle **302**. Lights and/or housings may be attached to the lens as described such that the lights illuminate the front portion, rear portion, and middle portion of the treadmill **100**.

FIG. **11** is a side view of the tread **102** and the cavity **1000** in which lights **1100** are located in the cavity and remain stationary relative to the tread **102**. The lights **1100** may include features similar to those of any lights previously described. The lights **1100** may be attached to cross members **1102**, which may or may not be members of the frame **202**. The cross members **1102** may be attached at opposing longitudinal ends to the frame **202**. In other embodiments, the lights **1100** may be attached to any member of the frame **202** or any other component located in the cavity **1000**. The lights **1100** are configured to emit light away from the cross members **1102** and through the adjacent slats. In the illustrated, non-limiting example, the lights **1100** are connected to cross members **1102** within the cavity **1000** such that the lights **1100** illuminate the middle portion of the treadmill **100**. In other embodiments, the lights **1100** may be connected to cross members **1102** such that the lights **1100** also illuminate the front and rear portions of the treadmill **100**. The controller **314** may control the color, brightness, and light emission frequency of the lights **1100** based on the position of the lights **1100** relative to the treadmill. For example, the controller **314** may control lights **1100** located near the front and rear portions of the treadmill **100** to emit yellow light through the adjacent slats. The controller **314** may also control lights **1100** located near the middle portion of the treadmill **100** to emit green light through the tread **102**. The lights **1100** can be placed such that there is at least one light associated with each slat. Alternatively, the lights can be spaced at intervals in the cavity not associated with the size of the slats.

The lighting system may include lights located on the slats forming the tread **102** such that the lights rotate with the tread **102** around the front axle **300** and the rear axle **302**. FIG. **12** is a side view of a slat **1200**. The slat **1200** may include a tread surface **1202** on which the user exercises. The slat **1200** may also include an underside **1204** which includes any surface of the slat **1200** that is not the tread surface **1202**, including any side surfaces. One or more lights **1206** may be attached to the underside **1204** of the slat such that the lights **1206** emit light through the adjacent slats **1200** forming the tread **102**. The lights **1206** may include features similar to those of any lights previously described. In the illustrated, non-limiting example, a series of lights **1206** are attached to the front surface of the underside **1204** of the slat **1200** (the leading edge). In other embodiments, a series of lights **1206** may be attached to both of the front and back surfaces of the underside **1204**. The lights **1206** may be attached to the underside **1204** of the slat **1200** and may include, as previously described, a light rope, light pipe, light guide or light bar attached to the leading edge of the underside of each slat **1200**.

The lights **1206** attached to each slat **1200** may be controlled by a controller. The controller may include the controller **314** or any other controller. The controller **314** may be configured to control the activation, deactivation, color, brightness, and/or light emission frequency of the lights **1206**. Alternatively, each slat **1200** may include a light controller attached to the underside **1204** of the slat **1200**. Each light controller may be configured to control the lights **1206** of each respective slat in the same manner as the controller **314**. Each light controller may be in communication with the controller **314**.

The controller **314** may be configured to control the activation, deactivation, color, brightness, and/or light emission frequency of the lights **1206** attached to the slat **1200** in response to determining the position of the slat **1200** relative to the treadmill. For example, the controller **314** may control the lights **1206** to emit light in a first color (e.g., yellow) in response to determining that the slat **1200** is located in the front portion or the rear portion of the treadmill **100**. The controller **314** may also control the lights **1206** to emit light in a second color (e.g., green) in response to determining that the slat **1200** is located in the middle portion of the treadmill **100**.

To power the lights attached to the slat **1200**, the slat **1200** may include a contactor **1208** attached to the underside **1204** and in electrical communication with the lights **1206**. The contactor **1208** may be attached to the underside **1204** within a recess defined by the underside **1204**. The contactor **1208** may receive power from a power rail (further described with respect to FIG. **13**) that extends along a length of the treadmill **100** and that is located in the cavity **1000**. The power received by the contactor **1208** may be supplied to the lights **1206**. The contactor **1208** receives power from the power rail, which remains stationary with respect to the tread **102**, in response to contacting the power rail while the slat **1200** rotates around the front and rear axles. The contactor **1208** may include a motor brush (e.g., carbon brush) or any other component configured to receive power from the power rail and supply the power to the lights **1206**. The slat **1200** may include multiple contactors **1208**, including a contactor for conducting a positive charge and a contactor for conducting a negative charge. The slat **1200** may include contactors **1208** located at opposing longitudinal ends of the slat **1200**.

FIG. **13** is a top perspective view of a power rail **1300**. The power rail **1300** may include an elongate member configured to supply power to the contactor **1208** in response to contacting the contactor **1208** as the slats (e.g., the slat **1200**) rotate around the front and rear axles. The power rail **1300** may receive power from the battery **310**, the power cord, the electric motor, or any other power source (referred to herein as a primary power source, such as a battery, power outlet, motor, generator or other suitable power source, typically one that provides power to the treadmill or treadmill accessories, such as the display). The power rail **1300** may be shaped to receive the contactor **1208** as the contactor **1208** and the slat **1200** rotate around the front and rear axles. For example, the power rail **1300** may include one or more channels configured to receive the contactor **1208**.

The power rail **1300** may include one or more strips of conductive material **1302** (e.g., copper) attached to an insulator member **1304**. The strip of conductive material **1302** supplies power to the contactor **1208** while the strip of conductive material **1302** and the contactor **1208** are in contact. The insulator member **1304** may be made of any insulating material (e.g., rubber or plastic) and may electrically insulate the strips of conductive material **1302** from other components of the treadmill **100**. The insulator member **1304** may include a wall **1306** configured to electrically insulate the strips of conductive material **1302** from each other (e.g., to separate positive contact and negative ground). Each of the strips of conductive material **1302** may receive one contactor **1208**. For example, one strip of conductive material **1302** may receive a first contactor and another strip of conductive material **1302** may receive a second contactor. The insulator member **1304** may be connected to the bearing supports **1008**, to any portion of the frame **202**, or to any other component of the treadmill **100** such that the contactor **1208** may contact the strips of conductive material **1302** while the slat **1200** rotates around the front and rear axles.

As the slats **1200** rotate around the front and rear axles, the contactors **1208** attached to the undersides **1204** of the slats **1200** contact the power rail **1300** and supply power to the lights **1206** attached to the respective slats **1200**. While powered, the lights **1206** emit light through the adjacent slats or in spaces between the adjacent slats to illuminate portions of the treadmill **100**. In some embodiments, every slat **1200** includes a contactor **1208**. The contactor **1208** of each slat may be configured to supply power to the lights **1206** connected to the underside **1204** of each respective slat **1200** in response to contacting the power rail **1300**. In such embodiments, when slats **1200** rotate such that the contactors **1208** no longer contact the power rail **1300**, the lights **1206** attached to the slats **1200** are not powered and do not emit light. The power rail **1300** may therefore be located in positions within the cavity **1000** where illumination of the treadmill **100** is desired. For example, the power rail **1300** may be positioned near a top of the cavity **1000** such that the power rail **1300** powers lights **1206** attached to slats **1200** that are presently located in the middle portion of the treadmill **100** as the slats **1200** rotate around the front and rear axles. In another example, portions of the power rail **1300** may extend around the front and rear axles of the treadmill **100**. In this configuration, the power rail **1300** may power lights **1206** attached to slats **1200** to illuminate the front, rear, and/or middle portions of the treadmill **100** as the slats **1200** rotate around the front and rear axles. The power rail **1300** may be continuous or may be placed in intervals along the path of the tread. The power rail **1300** may be along an entire path of the tread so that the lights on the slats are continuously lit. There may be a power rail **1300** only on one side of the treadmill, or there may be a pair of power rails positioned on opposing sides of the treadmill to provide power to both sides of the slat lighting.

In other embodiments, only some of the slats forming the tread **102** may include a contactor **1208**. In such embodiments, the slats including the contactor **1208** may be electrically connected to slats not including the contactor **1208** using one or more conductors **1210** (shown in FIG. **12**). The conductor **1210** may be in electrical communication with the contactor **1208**. The conductor **1210** can include a jumper wire or any other electrical connector. The conductor **1210** supplies power from the contactor **1208** in contact with the power rail **1300** to lights **1206** attached to slats **1200** that do not include contactors **1208**. In other words, the lights **1206** connected to slats other than the slat including the contactor **1208** may receive power from the conductor **1210** in response to the contactor **1208** contacting the power rail **1300**. In this configuration, the number of slats **1200** including contactors **1208** may be reduced. For example, if the tread **102** includes **64** slats connected in series, one of every **32** slats in the series may include a contactor **1208** such that one contactor **1208** is always in contact with the power rail **1300** as the tread **102** rotates around the front and rear axles. In this example, the lights **1206** attached to the **62** slats that do not include a contactor **1208** may be powered by the conductor **1210**. The contactor **1208** and the conductor **1210** may power the lights **1206** attached to each slat **1200** to illuminate the front, rear, and middle portions of the treadmill **100**.

FIG. **14** is a partial rear view of the slat **1200** including the contactor **1208** contacting the power rail **1300** according to one embodiment. In the illustrated, non-limiting example, two contactors **1208** are attached to the underside **1204** of the slat **1200**. One end of each contactor **1208** is in contact with the strips of conductive material **1302** of the power rail **1300**. The opposite end of each contactor **1208** includes an actuator **1400** (e.g., spring) configured to maintain contact between the contactor **1208** and the strip of conductive material **1302**. The strips of conductive material **1302** are connected to the insulator member **1304**. The wall **1306** separates and insulates the strips of conductive material **1302** from each other. The insulator member **1304** is connected to a bearing support **1402**. The bearing support **1402** may support bearings (not shown) configured to enable rotation of the belt **1404** around the front and rear axles. One end of the slat **1200** is connected to the belt **1404**. Another belt (not shown) may be connected to the slat **1200** at the opposite end of the slat **1200**. The bearing support **1402** is connected to the frame **202**. The conductor **1210** is connected to the underside **1204** of the slat **1200** in a recess **1406**.

FIG. **15** is a rear view of a portion of the slat **1200** including two contactors **1208** contacting the power rail **1300** according to another embodiment. In this embodiment, the power rail **1300** is a dual conducting power rail, meaning that it has parallel positive and negative rails in a single strip. In the illustrated, non-limiting example, each of the contactors **1208** includes a contact **1500** made of a conductive material. Each of the contacts **1500** includes a protrusion **1501** configured to contact the strip of conductive material **1302** as the slat **1200** rotates around the front and rear axles. The contact **1500** is configured to receive power from the conductive material **1302**. Each of the contactors **1208** includes an actuator **1502** (e.g., a compression spring) configured to apply a force to the contact **1500**. The force applied to the contacts **1500** by each of the actuators **1502** allows the contacts **1500** to maintain electrical communication with the conductive material **1302**. Each of the actuators **1502** receives power from the contacts **1500** and transmits the power to a washer **1504** (e.g., a nickel-plated copper washer). Each of the washers **1504** is configured to transmit the power received from the actuator **1502** to the lights **1206** via wiring (not shown). In other embodiments, the washers **1504** may include a plate or any other structure made of any conductive material.

FIG. **16**A is a top, partial cross-sectional view of a portion of the slat **1200** according to another embodiment. In the illustrated, non-limiting embodiment, the treadmill **100** may include two power rails **1300**. Each of the power rails **1300** is attached to one of the side rails **106** on opposing sides of the tread **102**, running parallel to at least a portion of the belt and/or bearing rail. Only one side of the slat **1200** and one of the power rails **1300** is shown in FIG. **16**A for clarity. Each of the power rails **1300** includes at least one strip of conductive material **1302** and an insulator member **1304** disposed around at least a portion of the conductive material **1302**. Each of the power rails **1300** is configured to receive one contactor **1208** (e.g., one contactor **1208** for conducting a positive charge and one contactor **1208** for conducting a negative charge). One of the contactors **1208** described with respect to FIG. **15** is attached to each longitudinal end of the slat **1200** within a recess **1600** defined by the slat **1200**. The contact **1500** of each contactor **1208** maintains electrical communication with the conductive material **1302** of a respective power rail **1300** as the tread **102** rotates around the front and rear axles. FIG. **16**B is a side view of the power rail **1300** supported by the bearing support **1008**, or bearing rail, the power rail **1300** extending around the front axle **300**, or front axle drum **304** if a drum is used. The power rail **1300** may extend all along the top of the tread and around the rear axle **302** or rear axle drum **306**. Alternatively, the power rail **1300** may only extend around the front and rear axles **300**, **302** or drums **304**, **306** so that the top middle of the tread is not lighted. As illustrated in FIG. **16**B, the power rail **1300** stops as the slats **1200** move under the treadmill **100** as there is no need to light up under the treadmill **100**.

FIG. **17** is a top perspective view of a portion of the slat **1200** according to another embodiment. In the illustrated, non-limiting embodiment, the slat **1200** includes a spring contact **1700**, or contact wire, extending from each longitudinal end of the slat **1200** instead of the contactors **1208** described with respect to FIGS. **12** and **14-16**. Only one spring contact **1700** and one longitudinal end of the slat **1200** are shown in FIG. **17** for clarity. Each of the spring contacts **1700** is made of a conductive material and is configured to transmit power from the power rails **1300** (not shown) described with respect to FIG. **16** to the lights **1206**. In other embodiments, the spring contacts **1700** may extend from the underside **1204** of the slat **1200** and may be configured to transmit power from the power rails **1300** described with respect to FIG. **14** to the lights **1206**. Each of the spring contacts **1700** includes a wire configured to maintain contact and electrical communication with a respective power rail **1300** while the tread **102** rotates around the front and rear axles. For example, each of the spring contacts **1700** can act as a compression spring such that a distal end **1702** of each of the spring contacts **1700** exerts a force on the respective power rail **1300** while the tread **102** rotates around the front and rear axles.

FIG. **18** is an exploded view of a portion of the slat **1200** according to another embodiment. The slat **1200** of FIG. **18** is shown without the tread surface **1202** for clarity. A first slat lens **1800** is attached to an end portion **1802** of the slat **1200**. The first slat lens **1800** may be, for example, a light guide and include a transparent or semi-transparent member configured to receive light from a light **1804** and to emit the light to a second slat lens **1806**. The first slat lens **1800** may be made of any plastic such as acrylic, glass, or any other material configured to refract light emitted by the light **1804**. The first slat lens **1800** may have a rectangular shape, a cylindrical shape, a tubular shape, or any other shape and may extend along any width of the slat **1200**. The first slat lens **1800** may include one or more protrusions **1803** configured to attach the first slat lens **1800** to the slat **1200**.

The light **1804** is attached to a side of the first slat lens **1800** opposite the end portion **1802** of the slat **1200**. In other embodiments, the light **1804** may be disposed between the end portion **1802** and the first slat lens **1800**. The light **1804** may include features similar to those of the lights **1206**. The light **1804** may include a controller configured to control the activation, deactivation, color, brightness, and/or light emission frequency of the light **1804** or may be controlled by the controller **314**. The light **1804** is in electrical communication with the contactors **1208** via wiring **1807**. An end cap **1808** is configured to attach to the end portion **1802** of the slat **1200** and is configured to enclose the light **1804** and the first slat lens **1800**. The end cap **1808** includes a recess **1810** in which the first slat lens **1800** and the light **1804** are disposed while the end cap **1808** is attached to the slat **1200**. The end cap **1808** may be made of an opaque material such that light emitted by the light **1804** is not visible to the user through the end cap **1808** or may be made of a transparent material such that light emitted by the light **1804** is visible to the user through the end cap **1808**. One first slat lens **1800**, one light **1804**, and one end cap **1808** may be attached to each longitudinal end of the slat **1200**, but only one of each are shown in FIG. **18** for clarity.

The second slat lens **1806** is attached to the front surface (leading edge) of the underside **1204** of the slat **1200**, but in other embodiments may be attached to the back surface of the underside **1204** or to any other portion of the slat **1200**. The tread surface **1202** may overhang the leading edge or may be flush with the leading edge. The second slat lens **1806** may be, for example, a light pipe and include a transparent or semi-transparent member configured to receive light from the first slat lens **1800** and to emit the light through the adjacent slats **1200** forming the tread **102**. The second slat lens **1806** may be made of any plastic such as acrylic, glass, or any other material configured to refract light emitted by the light **1804**. The second slat lens **1806** may have a rectangular shape, a cylindrical shape, a tubular shape, or any other shape and may extend along any length of the slat **1200**. When activated, light emitted by the light **1804** is refracted through the first slat lens **1800** and the second slat lens **1806** such that the light is emitted through the adjacent slats.

One or more of the slats **1200** may include one or more brushes **1812** attached to the underside **1204** of the slat **1200**. The brushes **1812** are also shown in FIG. **16**B. In the illustrated, non-limiting embodiment, two brushes **1812** are attached to a bottom surface of the slat **1200**. Each of the brushes **1812** is configured to contact the conducive material **1302** of the power rail **1300** as the slat **1200** rotates around the treadmill. The contact between the brushes **1812** and the conductive material **1302** cleans dirt, dust, contamination, and/or debris from the conductive material such that electrical communication is maintained between the contactors **1208** and the power rail **1300**. At least one brush **1812** may be located on the underside **1204** of the slat **1200** adjacent to each contactor **1208**. In other embodiments, the brushes **1812** may be located on any portion of the slat **1200** so long as they contact the power rail. Each brush **1812** may be located upstream or downstream of a contactor **1208**. In some embodiments, multiple brushes **1812** may contact one strip of conductive material **1302**. In embodiments where the power rail **1300** is located to the side of the slats **1200**, one or more brushes **1812** may be located on one or more sides of the slats **1200**. Each slat **1200** may include one or more brushes **1812**, but in other embodiments only one slat **1200** may include one or more brushes **1812**, or brushes **1812** may be located on slats (e.g., two slats) **1200** periodically spaced along the tread.

FIG. **19**A is an exploded view of another embodiment of a lighted slat **1900**, similar to the embodiment in FIG. **18**, and FIG. **19**B is a cross section of the slat **1900**. The slat **1900** can be used with any contact and power rail supply disclosed herein. The lighted slat **1900** in this embodiment is formed of a base slat **1902** of plastic, aluminum, plasticized fiber or other suitable material, typically made by injection molding, with a user contact surface **1904** on which the user steps. The user contact surface **1904** can be integral with the base slat **1902** and can be of the same material or of a different material, or can be a separate overmold, such as a rubber overmold, and can have non-slip protrusions **1905**. The base slat **1902** has an underside **1906** which may have one or more structural ribs, or may have no structural ribs. A control printed circuit board **1908**, or light controller, can be attached to the underside **1906** of the base slat **1902**, such as on a rib. LED circuit boards **1910**, if used, can also be attached to the underside of the base slat **1902**. There can be a single LED circuit board configured to control multiple LEDs or there can be an LED circuit board **1910** associated with one or a portion of the LEDs. Alternatively, the LEDs can be without a circuit board. The control circuit board **1908** can be wirelessly connected to a main controller that receives input from the display **112**, which can be a touchscreen, or have preprogrammed lighting controls. The control circuit board **1908** and the LED circuit boards **1910** or the LEDs themselves are in electronic communication, either wired or wirelessly. The control circuit board **1908** is not required if the lights simply light up as one color when powered by a power source. The LEDs can be powered from the power source directly, and will light when powered and be off when not powered. The slat **1900** also has a light pipe **1912** and an optional diffuser **1914** over the light pipe **1912**. A curved light guide may be used on the corners of the slat to further illuminate the corners. The base slat **1902** may be recessed along the leading edge **1918** as needed to accommodate the light pipe **1912** and optional diffuser **1914**. In addition to the LED circuit boards **1910** at the ends of the lighted slat **1900**, which can be the only light source, one or more LEDs **1916**, shown in FIG. **19**B, can be positioned between the leading edge **1918** of the base slat **1902** and the light pipe **1916**. Alternatively or additionally, an LED may be positioned at each end **1920** of the light pipe **1912** rather than an LED circuit board. The light pipe **1912** can be any configuration of light pipe, examples of which are shown in FIGS. **20**A-**20**C. Light pipes **1912**A-**1912**C are illustrated with an optional diffuser **1914** and an LED **1916** for illustrative purposes. The light pipe **1912** and diffuser **1914** can run the entire length of the slat **1900** or can be any portion of the length of the slat. It is noted that the LEDs used in these examples can be micro LEDs, printed LEDs, light paper, ribbon LEDs cut to length across the leading edge, or any other LED configuration known to those skilled in the art, or can be another light source as previously discussed. The LEDs can be soldered on a micro board and recessed in the base slat. The LEDs are connected in parallel and to the power source and can be connected to the control printed circuit board. The control printed circuit board can control the LEDs as well as wirelessly communicate with the treadmill biometric sensors and/or the display.

FIG. **21**A is a top plan view of another embodiment of a lighted slat **2000**, and FIG. **21**B is a cross section of the slat **2000**. The slat **2000** can be used with any contact and power rail supply disclosed herein. The slat **2000** has a pattern of light points **2002** formed into the user contact surface **2004**. Each light point **2002** is created with a fiber optic **2006** that is fed up through apertures in the base slat **2008** and user contact surface **2004** so that the fiber optic **2006** ends up flush with or within the user contact surface **2004**. The fiber optic light is a flexible light pipe that transmits light from a light source, such as an LED. A user will not disrupt the fiber optics **2006** when walking or running on the slats **2000**. The apertures that receive the fiber optics that form the light points **2002** can be created in any pattern desired or required, with the pattern of rows illustrated in FIG. **21**A as a non-limiting example. The pattern may be a word or symbol that is used as advertising, such as the name or logo of the manufacturer of the treadmill or the gym in which the treadmill is being used. The pattern may be used to signify a speed or a biometric parameter. Each slat can have the same or a different pattern. Only certain slats may be lighted with a pattern. For example, the lighted slat may be programmed to only light up when a certain speed is reached, indicating to the user to either speed up or slow down or maintain the speed, based on a target speed a user inputs. A slat with a specific pattern may light up to represent a biometric parameter range has been attained, such as heart rate. A different slat with a different pattern may light up when the speed or the biometric parameter are in a different range. The fiber optics in a single slat may create more than one lighted pattern, only lighting a portion of the fiber optics to create the pattern. A controller can control which pattern is presented at which time. A light guide can run the length of the pattern just under the user contact surface **2004** as desired to create a particular look. A control printed circuit board **2010** can control the lighting of the pattern, and be connected to the light source of each fiber optic.

FIGS. **22**A-C illustrate another embodiment of a lighted slat **2100**. In this embodiment, rather than using fiber optic strands to form a pattern with light points, a shape is formed out of a light guide **2102** of acrylic or other suitable material that is illuminated with one or more light sources. The user contact surface **2104** is cut to receive the light guide **2102** such that the light guide **2102** fits within and substantially flush, or just under flush, with the user contact surface **2104**, like a puzzle piece. As illustrated in FIG. **22**A, a single lighted slat **2100** may be used along with standard, unlighted slats to form the tread **102**, with the single lighted slat **2100** having a patterned light guide **2102**, which can be in the shape of anything, or provide a template for advertising a name or presenting a word or phrase, represented by the "XX" as non-limiting examples. More than one slat at intervals along the tread can be a lighted slat **2100** with the same or a different pattern.

FIG. **22**B illustrates the use of multiple adjacent lighted slats **2100** to form a cohesive pattern across two or more slats, the cohesive pattern seen as the tread **102** rotates around the axles and between side rails **106**. Using multiple slats to present one cohesive pattern provides a larger medium on which the cohesive pattern can be formed. Using two adjacent lighted slats as an example, a first light guide **2200** is cut in a shape of a first pattern and configured to fit within a first cut-out **2202** of a user contact surface **2204** of a first lighted slat **2206**, and a first light source is positioned to illuminate the first light guide **2200**. For example, an LED **2208** may be positioned on the leading edge of the first lighted slat **2206** where needed depending on the pattern to illuminate the first light guide **2200**. A second lighted slat **2210** adjacent to the first lighted slat **2206** has a user contact surface **2204** with a second cut-out **2212** in a second pattern in the user contact surface **2204**. A second light guide **2214** is cut in a shape of a second pattern and configured to fit within the second cut-out **2212**. A second light source **2216** is positioned to illuminate the second light guide **2214**. It is noted that the pattern in the second lighted slat **2210** has three separate pieces so three separate cut-outs as a non-limiting example. The first light guide **2200** and the second light guide **2214** together form a cohesive pattern.

FIG. **22**C is a cross section of a lighted slat **2100**, showing the light guide **2102** cut into a pattern and fitted within a cut-out **2103** of the user contact surface **2104**, with at least one light source **2106** associated with the light guide **2102**. The light source **2106** can be, for example, micro LEDs, printed LEDs or light paper that do not interfere with the fit between the light guide **2102** and the user contact surface **2104**. A control circuit board, or controller, can be attached to the underside of the slat to wirelessly control the light source via a main controller receiving input from a user display/input panel or preprogrammed input.

FIGS. **23**A-**25** illustrate another means of providing power to the lighted slats as disclosed herein. In this embodiment the power rails rotate rather than remain stationary as in the power rails previously described. The power rails are configured as rotating disks. Four metal power discs **3000** are each anchored with fasteners **3003** to a respective belt wheel **3002**, a belt wheel **3002** positioned at each end of each of the front and rear axles **300**, **302** to guide the belt about the axles. The two power discs on the right side are positive or negative, and the two power disks on the left side are the other of positive or negative. The power disk **300** is attached to the outer-facing side **3004** of each belt wheel **3002** as illustrated in FIG. **24**. It should be noted that the power discs **3000** can be made to attached directly to the axles or the axle drums if used. However, attaching the power discs **3000** to the existing plastic belt wheels **3002** takes up less space and decreases costs. The power disk **3000** does not need to be as deep as it is shown. The power disk **3000** need only be as deep as the fasteners **3003** and provide a contact area for a spring-loaded carbon brush **3020**.

The power disk **3000** is illustrated in FIGS. **23**A and **23**B and can be a solid disk with an opening **3006** for the axle **300**, **302** or axle drum if used. However, to ensure contact between the power disk **3000** and a slat conductor **3008**, the power disk can have slots **3010** cut at intervals along the circumference **3012** of the power disk **3000** to provide flexibility at the point that the power disk **3000** contacts the slat conductor **3008**. Additionally, the circumference **3012** of the power disk **3000** can have a convex contact region **3014** to further ensure contact between the power disk **3000** and the slat conductor **3008**.

The lighted slat **1900**, which can be any of the slats disclosed herein, carries a slat conductor **3008** at each end of its underside as illustrated in FIG. **24**. Each end of the lighted slat **1900** is attached to a respective belt **1404** which travels in the respective belt wheel **3002**, moving the lighted slat **1900** around the axles **300**, **302**. The slat conductor **3008** can be attached to the underside of the lighted slat **1900** via a belt anchoring screw **3016**, with two being illustrated but not necessary. Alternatively, the slat conductor **3008** can be separately attached to the lighted slat **1900**. The slat conductor **3008** is illustrated as a hook to provide some spring or flexibility to the slat conductor **3008** to further ensure contact between the slat conductor **3008** and the power disk **3000**. Alternatively, the belt anchoring screw **3016** can act as the slat conductor, contacting the power disk **3000** directly. Proper alignment between the components would need to be ensured to provide the requisite contact between the power disk **3000** and the belt anchoring screw **3016**. In contact with the belt anchoring screw **3016** is a light contact **3018**, which is wired to the light used in the lighted slat **1900**. For example, one or more LEDs may be wired to the light contact **3018**. The light contact **3018** may be wired to an LED circuit board. More than one light source, such as LED, may be run in parallel along the lighted slat **1900** between the light contacts **3018** at each end of the lighted slat **1900**.

A spring-loaded brush **3020** is associated with each of the four power disks **3000**. As used herein, "carbon brush" denotes a sliding contact used to transmit electrical current from a static to a rotating part. For example, the contactor **1208** is a carbon brush that transmits electrical current from the status power rail to the rotating slat. In this embodiment, the carbon brush **3020** transmits electrical current or power from the static brush to the rotating power disk **3000**. Each carbon brush **3020** is connected to a power source (referred to herein as a primary power source, such as a battery, power outlet, motor, generator or other suitable power source, typically one that provides power to the treadmill or treadmill accessories, such as the display). The carbon brush **3020** provides power to the respective power disk **3000**, which in turn provides power to the slat conductor **3008**, which in turn provides power to the lighted slat **1900** via the light contact **3018**. The light contact **3018** can be, for example a nickel-plated barium copper soldering clip. Each spring-loaded carbon brush is mounted on the treadmill **100** on a metal cross brace **3022**, for example, such that it is aligned for contact with the respective power disk **3000**. Each spring-loaded carbon brush **3020** has a housing **3024** which can be plastic or metal, a piston **3026**, and a spring **3028** that presses against the piston **3026** to keep the piston **3026** in contact with the power disk **3000**. The piston **3026** can be bronze, for example. The piston **3026** should be a different material than the power disk **3000** to avoid corrosion.

FIG. **25** is an illustration of an example of the spring-loaded carbon brush **3020**. It is noted that this is an example of the intricacies that are required to align the piston properly and maintain continuous contact with the power disk **3000**. However, other means are contemplated that produce the same function, achieving the same effect. The housing **3024** is a threaded housing, with an outer housing member **3030** attached to the treadmill, such as to a cross-bar or brace **3022** of the treadmill. An inner housing member **3032** is threaded to the outer housing member **3030**. The piston **3026** has a wire **3034**, such as a stranded mesh copper wire, soldered to it that electrically connects the piston **3026** to the battery wire **3036** via a stud **3038**, such as a barium copper threaded stud, connected to a washer clip **3040** which is secured to the stud **3038** with screw **3042**. The piston **3026** is inserted into the housing **3030** with the wire **3034** attached. A spring **3044** is then inserted and the wire **3034** connected to the stud **3038**. The stud **3038** is attached to a housing end **3046** which is threaded into the end of the housing **3030**, threaded to both the outer housing member **3030** and the inner housing member **3032**. The washer clip **3040** is attached with screw **3042**, connecting the power source to the piston **3026**.

To ensure that the piston **3026** properly contacts the power disk **3000**, the inner housing member **3032** can be adjusted, thus adjusting the piston **3026**, by turning the housing end **3046**. The spring **3044** is under pressure so that it applies constant pressure to the piston **3026** once the piston is properly aligned for contact with the power disk **3000**. A metal lock screw **3048** is used to lock the inner housing member **3032** against the outer housing member **3030** so the alignment of the piston **3026** is secured. This embodiment, with the power disk **3000** and the spring-loaded carbon brush **3020**, eliminates the need for a carbon brush, such as contactor **1208**, on each slat to be lighted. In this embodiment, each slat to be lighted only needs a simple slat conductor **3008** on each end. Because the slats only contact the power disk **3000** when traveling around either the front or rear axles **300**, **302**, the slats may only be lit at such times. In one embodiment, each slat lights up yellow when the slat conductor **3008** is in contact with the power disk **3000**. At any given time, the number of slats that will be powered by the power disks will be the same, about 4-6 slats around each of the front and rear axle. These yellow-lit slats are a visual warning to those around the treadmill that the treadmill is in use and the tread is rotating. To light the slats when traveling between the front and rear axles **300**, **302**, the light on each slat can be electrically connected in series to an adjacent light, thereby being powered by the power disk **3000** through the slat conductors **3008** that are in contact with it, which will continually change as the tread moves.

As an alternative power source for any of the lighted slats disclosed herein, a lighted slat may carry a battery to power the light source on the lighted slat, the battery connected to the underside of the base slat. This power option may be suitable for the lighted slat **2100** in which the lighted slat is used for advertisement rather than lighting up a particular section of the tread that may coincide with a power rail, for example. A wireless controller may control the battery based on operation of the treadmill, the controller wirelessly tied to a main treadmill controller.

Other means of providing power to the lighted slats as known to those skilled in the art are contemplated. As another example, plastic vanes can be attached to the underside of the slats, with the slat having two contact points where the light source wires are connected, one on each side. As the slats move around the axles, the vanes make contact with a stationary power rail, lighting up the slats.

The treadmill **100** may include one or a combination of any of the stationary lighting located in the cavity **1000** and lights attached to any part of the slats as disclosed herein. As previously described, the lighting system may include a first set of lights configured to illuminate a front portion of the treadmill **100**, a second set of lights configured to illuminate a rear portion of the treadmill **100**, and a third set of lights to illuminate a middle portion of the treadmill **100**. Any of first set of lights, the second set of lights, or the third set of lights may include embodiments of the lighting system described with respect to FIGS. **9-22** in any combination. For example, the first set of lights may include the first lens **902** extending around the front axle drum **304** and the lights **900** attached to the lens **902** as previously described. The second set of lights may include the second lens extending around the rear axle drum **306** and the lights attached to the second lens as previously described. The third set of lights may include the lights **1206** attached to the slats **1200** forming the tread **102**. The power rail **1300** may extend along a length of the middle portion of the treadmill **100** such that the lights **1206** are only powered to emit light as they rotate through the middle portion of the treadmill **100** along a top of the cavity **1000**. In this configuration, the lights **1206** are not powered as the slats **1200** are rotated through the front and rear portions of the treadmill. In other embodiments, the power rail **1300** may also be positioned such that the lights **1206** are only powered as the slats **1200** are rotated through the front and/or rear portions of the treadmill. Alternatively, the lights **1206** may be controlled by the controller **314** to emit light in response to the controller **314** determining that the lights **1206** are located in the middle portion of the treadmill **100**. In another example, the third set of lights may include the lights **1100** attached to cross members **1102** within the cavity **1000** such that the lights **1100** emit light through the adjacent slats to illuminate the middle portion of the treadmill **100**.

The lighting systems described herein can be used in many different ways, some of which are described here. For example, the lights may be turned on when the proximity sensor detects a person approaching the treadmill **100**. The lights may be controlled to flash as a warning to the approaching person. The lights may be turned on and to a color such as green inviting the approaching person to use the treadmill **100**. The lighting systems may be used while the treadmill is in operation. The lights may be used while the tread is rotating to warn others around the treadmill that the tread is moving. The lights may be used to vary color in response to the user's temperature as measured by the non-contact temperature sensor or may represent values of other biometrics of the user. The lights may be used to indicate the speed of the tread. The lights may be used to indicate a safe region on the tread for which the user to stay when exercising. The lights may be used to be aesthetically pleasing. The lights may be used for advertisements.

Some or all of the lighting systems herein can be used with other machines such as moving escalators or moving sidewalks. The lighting herein can be modified for use with exercise bikes, rowing machines and stair climbers, as non-limiting examples.

The word "example" is used herein to mean serving as an example, instance, or illustration. Any aspect or design described herein as "example" is not necessarily to be construed as preferred or advantageous over other aspects or designs. Rather, use of the word "example" is intended to present concepts in a concrete fashion. As used in this application, the term "or" is intended to mean an inclusive "or" rather than an exclusive "or". That is, unless specified otherwise, or clear from context, "X includes A or B" is intended to mean any of the natural inclusive permutations. That is, if X includes A; X includes B; or X includes both

A and B, then "X includes A or B" is satisfied under any of the foregoing instances. The articles "a" and "an" as used in this application and the appended claims should generally be construed to mean "one or more" unless specified otherwise or clear from context to be directed to a singular form. Moreover, use of the term "an implementation" or "one implementation" throughout is not intended to mean the same embodiment or implementation unless described as such.

Implementations of the controller **314** and any other controller described herein (and the algorithms, methods, instructions, etc., stored thereon and/or executed thereby) can be realized in hardware, software, or any combination thereof. The hardware can include, for example, computers, intellectual property (IP) cores, application-specific integrated circuits (ASICs), programmable logic arrays, optical processors, programmable logic controllers, microcode, microcontrollers, servers, microprocessors, digital signal processors or any other suitable circuit. The terms "signal" and "data" are used interchangeably. Further, portions of the controller **314** or any other described controller do not necessarily have to be implemented in the same manner.

Further, in one aspect, for example, the controller **314** can be implemented using a general-purpose computer or general-purpose processor with a computer program that, when executed, carries out any of the respective methods, algorithms and/or instructions described herein. In addition, or alternatively, for example, a special purpose computer/processor can be utilized which can contain other hardware for carrying out any of the methods, algorithms, or instructions described herein.

Further, all or a portion of implementations of the present disclosure can take the form of a computer program product accessible from, for example, a computer-usable or computer-readable medium. A computer-usable or computer-readable medium can be any device that can, for example, tangibly contain, store, communicate, or transport the program for use by or in connection with any processor. The medium can be, for example, an electronic, magnetic, optical, electromagnetic, or a semiconductor device. Other suitable mediums are also available.

While the disclosure has been described in connection with certain embodiments, it is to be understood that the disclosure is not to be limited to the disclosed embodiments but, on the contrary, is intended to cover various modifications and equivalent arrangements included within the scope of the appended claims, which scope is to be accorded the broadest interpretation so as to encompass all such modifications and equivalent structures as is permitted under the law.

What is claimed is:

1. A treadmill having a tread comprising multiple slats configured to rotate around a front axle and a rear axle of the treadmill, wherein at least one of the multiple slats is a lighted slat, the lighted slat comprising:

a slat base having an upper surface, a leading edge and an underside; and

a light attached to the slat base, the treadmill further comprising:

a power source for the light.

2. The treadmill of claim **1**, further comprising a controller provided on the underside of the slat base and in communication with the light, the controller controlling at least one of on/off, intensity and color.

3. The treadmill of claim **1**, wherein the light comprises:

a light pipe extending along at least a portion of the leading edge of the slat base; and

a light source positioned on the slat base to illuminate the light pipe.

4. The treadmill of claim **3**, wherein the light source is one or more of a micro LED, printed LED, and light paper.

5. The treadmill of claim **3**, wherein the light source is positioned at each end of the light pipe.

6. The treadmill of claim **3**, wherein the light source is positioned along a length of the light pipe between the leading edge and the light pipe.

7. The treadmill of claim **1**, wherein the upper surface of the slat base includes a user contact surface having apertures formed in the user contact surface to create a pattern, and wherein the light comprises:

a fiber optic associated with a respective aperture, the fiber optic having a light end positioned at the underside of the slat base and a lighted end of the fiber optic inserted into the respective aperture, the lighted end substantially flush with the user contact surface such that the lighted end is visible but does not protrude from the user contact surface.

8. The treadmill of claim **7**, further comprising a controller provided on the underside of the slat base and in communication with each fiber optic, the controller configured to control each fiber optic individually for one or more of on/off, color and intensity.

9. The treadmill of claim **1**, wherein the upper surface of the slat base includes a user contact surface with a cut-out in a pattern in the user contact surface, the light comprising:

a light guide in a shape of the pattern and configured to fit within the cut-out; and

a light source positioned to illuminate the light guide.

10. The treadmill of claim **9**, further comprising a controller provided on the underside of the slat base and in communication with the light source, the controller controlling at least one of on/off, intensity and color.

11. The treadmill of claim **9**, wherein the light source is one or more of a micro LED, printed LED, and light paper.

12. The treadmill of claim **1**, comprising two adjacent lighted slats, wherein a first lighted slat of the two adjacent lighted slats has a first upper surface including a first user contact surface with a first cut-out in a first pattern in the first user contact surface, a first light of the first lighted slat comprising:

a first light guide in a shape of the first pattern and configured to fit within the first cut- out; and

a first light source positioned to illuminate the first light guide; and

wherein a second lighted slat of the two adjacent lighted slats has a second upper surface including a second user contact surface with a second cut-out in a second pattern in the second user contact surface, a second light of the second lighted slat comprising:

a second light guide in a shape of the second pattern and configured to fit within the second cut-out; and

a second light source positioned to illuminate the second light guide, wherein the first light guide and the second light guide together form a cohesive pattern.

13. The treadmill of claim **12**, wherein the first light source and the second light source are one or more of a micro LED, printed LED, and light paper.

14. The treadmill of claim **1**, wherein the power source comprises:

a stationary power rail electrified by a primary power source; and

two contactors connected to the lighted slat and in contact with the stationary power rail.

15. The treadmill of claim **14**, wherein the stationary power rail is a dual conducting power rail extending parallel to at least one belt; and

the two contactors are two carbon brushes in contact with the dual conducting power rail as the lighted slat moves along the dual conducting power rail, the two carbon brushes electrified by the dual conducting power rail and in electrical communication with the light.

16. The treadmill of claim **14**, wherein the stationary power rail comprises:

a first power rail and a second power rail extending parallel to the first power rail, the first and second power rails positioned parallel with the at least one belt, and wherein the two contactors comprise a first carbon brush attached to the lighted slat and in contact with the first power rail and a second carbon brush attached to the lighted slat and in contact with the second power rail, wherein the first carbon brush and the second carbon brush conduct power to the light from the first and second power rails.

17. The treadmill of claim **14**, wherein the stationary power rail comprises:

a first power rail and a second power rail extending parallel to the first power rail, the first and second power rails positioned parallel to at least one belt, wherein the two contactors comprise a first wire contact attached to the lighted slat and in contact with the first power rail and a second wire contact attached to the lighted slat and in contact with the second power rail, wherein the first wire contact and the second wire contact conduct power to the light from the first and second power rails.

18. A treadmill having a tread comprising multiple slats configured to rotate around a front axle and a rear axle of the treadmill, wherein at least one of the multiple slats is a lighted slat, the lighted slat comprising:

a slat base having an upper surface, a leading edge and an underside;

a light pipe attached to the leading edge of the slat base and extending along the leading edge; and

a light source attached to the slat base and configured to illuminate the light pipe, wherein the light source is at least one LED, the treadmill further comprising:

a power source for the light source.

19. The treadmill of claim **18**, wherein each of the multiple slats is a lighted slat.

* * * * *